

PHYSICAL DEVELOPMENT MASTER PLAN **for the** **COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS**



Volume III
TINIAN

Prepared for
OFFICE OF
TRANSITION STUDIES AND PLANNING

Prepared by
PACIFIC PLANNING AND DESIGN CONSULTANTS
Chalan Kanoa, Saipan
Tamuning, Guam

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v.3

January 1978

U. S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
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CHARLESTON, SC 29405-2413

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FOR THE
COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS

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Office of Transition Studies and Planning
Government of the Northern Mariana Islands

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HN49.C6 P59 1978 V.3
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FOREWORD

The following summary highlights the Tinian Master Plan and places the full text in a readily identifiable perspective. The format, in the sequence of the text, should assist the reader in quickly locating plan elements or particular areas of interest.

POPULATION: 1300-1800	The present population of 900 is expected to increase to at least 1200 by 1985. By 1990 there will be between 1300 and 1800 persons living on Tinian, exclusive of any major military build up.
SAN JOSE TO REMAIN URBAN CENTER	Past investment in buildings and infrastructure suggests that San Jose Village should remain the primary urban center of Tinian.
AGRICULTURE TOURISM	Agriculture and tourism are the predominant economic activities on Tinian. Agriculture will continue to be a way of living for many of the people. Tourism is expected to increase in importance and new tourist facilities will be necessary. The plan reinforces the development of agriculture and tourism as major sectors of Tinian's economy.
MILITARY	Two-thirds of Tinian is committed for eventual lease to the United States for military defense purposes. Although base construction will not occur for several years, it will someday happen. Several impacts will be felt on Tinian. Extensive construction activities will bring employment opportunities but will require skilled labor. Active military facilities will bring permanent job opportunities but also a large influx of temporary residents who will have separate but

unequal housing, purchasing power, and other amenities. Income from the leased land will become available to the Commonwealth, but the loss of the lands which produce this income will make those public lands remaining on Tinian even more scarce.

LAND USE PLAN The land use plan is sensitive to environmental constraints, the scarcity of land resources, and to the prevailing lifestyle. Seven major land use zones are proposed for Tinian.

Conservation The Conservation Zone includes shoreline areas, beaches, inland areas with rugged topography, wetlands, swamps, some agriculture areas, and historic sites. Puntan Masalog, Castiyo, Carolinas, Diablo, and Tadung, Hagoi (Lake), Sisonyan Magpo, Taga House, and North End, South End, and Long Beach Parks will be placed into the Conservation Zone.

Agriculture The Agricultural Zones protect and encourage agriculture on the best available lands. Agricultural homesteads are also in this zone. The Cooperative Farm area, Sisonyan Magpo, the Carolinas and Masalog plateaus (lands leased to MDC), and the Marpo Valley are specific areas which will continue to be zoned for Agriculture.

Residential Residential zones will encompass San Jose Village and provide for orderly residential expansion. San Jose Village will continue to have a mix of small stores and services. A new village homestead subdivision and a MIHA housing project will develop on lands east of the existing village.

AGRICULTURE	The plan provides for establishment of beef cattle grazing lots and expansion of the irrigation system for both cattle grazing and cultivation.
WATER	Water is, and will remain, most precious. Besides an aggressive metering and public education awareness program, several specific improvements are recommended and include: new reservoir tank and main transmission line; replacement and enlargement of distribution lines; service will be provided to the new village homestead lands; replacement of chlorinator; and should studies indicate feasibility, the construction of an irrigation line to serve the northern Marpo Valley area.
POWER	An additional 600 KW generator will supplement the existing power plant. The distribution system will be changed to provide dual circuitry.
SEWERAGE	The plan recommends deferment of public sewerage collection, treatment, and outfall facilities until a viable and cost-effective alternative is developed. During the initial plan period, individual and group septic tank/cesspool facilities are recommended.
SOLID WASTE	The present dumpsite should be retained, but must be converted into a sanitary landfill operation.
AIRPORT	Proposed improvements include the construction of a new terminal building and a crash fire rescue building as well as improvements to insure that the Tinian Airport meets safety and security requirements.

Each will be designed with commercial uses in a central village area. Rural residential development of lesser intensity will occur to the north of San Jose.

Commercial Industrial	A small commercial area will be located at the village center of the New Subdivision. More intensive commercial activities will be located east of Broadway, as will light industrial or agricultural related industrial. Industrial lands near the civilian port area have use restrictions requiring that they be utilized for harbor and port-oriented facilities.
Hotel Resort	A new hotel and resort site is designated for lands south of the new Village Homestead Area, between Jones Beach and Taga Quarry Beach.
CIVIC CENTER	The plan provides for expansion of the civic center to include construction of a fire and police station and courthouse.
HEALTH	Health facilities will be improved and expanded by construction of an Environmental Health/Public Health addition and a new dispensary at the civic center.
EDUCATION	The present school site will be expanded into a complete educational campus including high school, vocational, and elementary school facilities.
RECREATION	Several beach parks will be developed or improved. Outdoor recreational facilities at the school will be expanded, and a recreational facility will be developed in the new subdivision.

HARBOR The plan calls for upgrading the harbor concurrently with the initiation of military activities. Early in the plan period FDAA funds will be utilized to reconstruct facilities damaged by Typhoon Pamela.

ROADS The road improvement program for Tinian will concentrate on village streets and provision of access into the Marpo Valley agricultural areas. An alternate route between the harbor and airport will be provided.

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BACKGROUND

GOALS AND OBJECTIVES

NATURAL SETTING FOR PLANNING

SOCIO-DEMOGRAPHIC SETTING

LAND MANAGEMENT FACTORS

GOALS AND OBJECTIVES

Basic goals and objectives directing the development of the Tinian Physical Master Plan have been provided by the Office of Transition Studies and Planning. These goals and objectives are listed below:

- * Develop a viable physical development plan for Tinian which will provide an adequate framework for accommodating the socio-economic and political changes facing island residents.
- * Prepare a Capital Improvements Program for the next seven years based upon the physical development plan for the Island of Tinian.
- * Prepare a physical master plan which provides for possible development of military facilities on Tinian.
- * Provide for the orderly growth of the Tinian community with special attention to the conservation of natural resources.
- * Coordinate urban growth and economic development through the timely provision of roads, utilities, harbors and other capital improvements projects.
- * Recognize natural environmental constraints such as slopes, soils, and water in the location and development of growth areas and preserve to the maximum extent possible the scenic and natural character of the island.

NATURAL SETTING FOR PLANNING

GEOGRAPHY

The Mariana Islands including Guam constitute a chain of 17 islands (three of which form the Island of Maug) that extend about 440 miles along a north-south axis. Total land area of the Marianas chain is 399.11 square miles. Tinian, the third largest in the chain, has approximately 39 square miles. (See Plate 1).

Tinian is located in the Western Pacific Ocean at about 15 degrees north latitude and 145 degrees 37 minutes east longitude. The nearest islands are Saipan, 3 miles to the north, and Agiguan, 5 miles to the southwest. Guam, the largest island in the Marianas, is 100 miles south-southwest. The larger continental groups of Japan, Ryukyus, Philippines and New Guinea, range north to south from 1000 to 1500 nautical miles from Tinian in a north-western arc.

GEOLOGY

The Marianas are located along a rising range, lifted upward by tectonic forces resulting from the subsidence of the Pacific Basin. The slight curvature of the arc, as well as the geomorphology of the islands, indicates that the Marianas are youthful, probably dating from the Eocene Period, approximately three to four million years ago.

Geologically, the islands fall into two regions, a younger chain of small purely volcanic islands extending from Anatahan northward, and an older more complex group, consisting of the six southern islands of which Tinian is a part. The northern islands retain their initial volcanic form. Gu-guan, Pagan, Agrihan, Asuncion, and Farralon de Pajaros in this group are either active volcanoes at present or have

MARIANA ISLANDS

Farallon de Pajeros

Maug Islands

Asuncion Island

Agrihan

Pagan

Alamagan

Guguan

Sarigan

Anatahan

Farallon de Medinilla

Saipan
TINIAN
Aguijan

Rota

Guam



TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
NORTHERN MARIANA ISLANDS
vicinity

1

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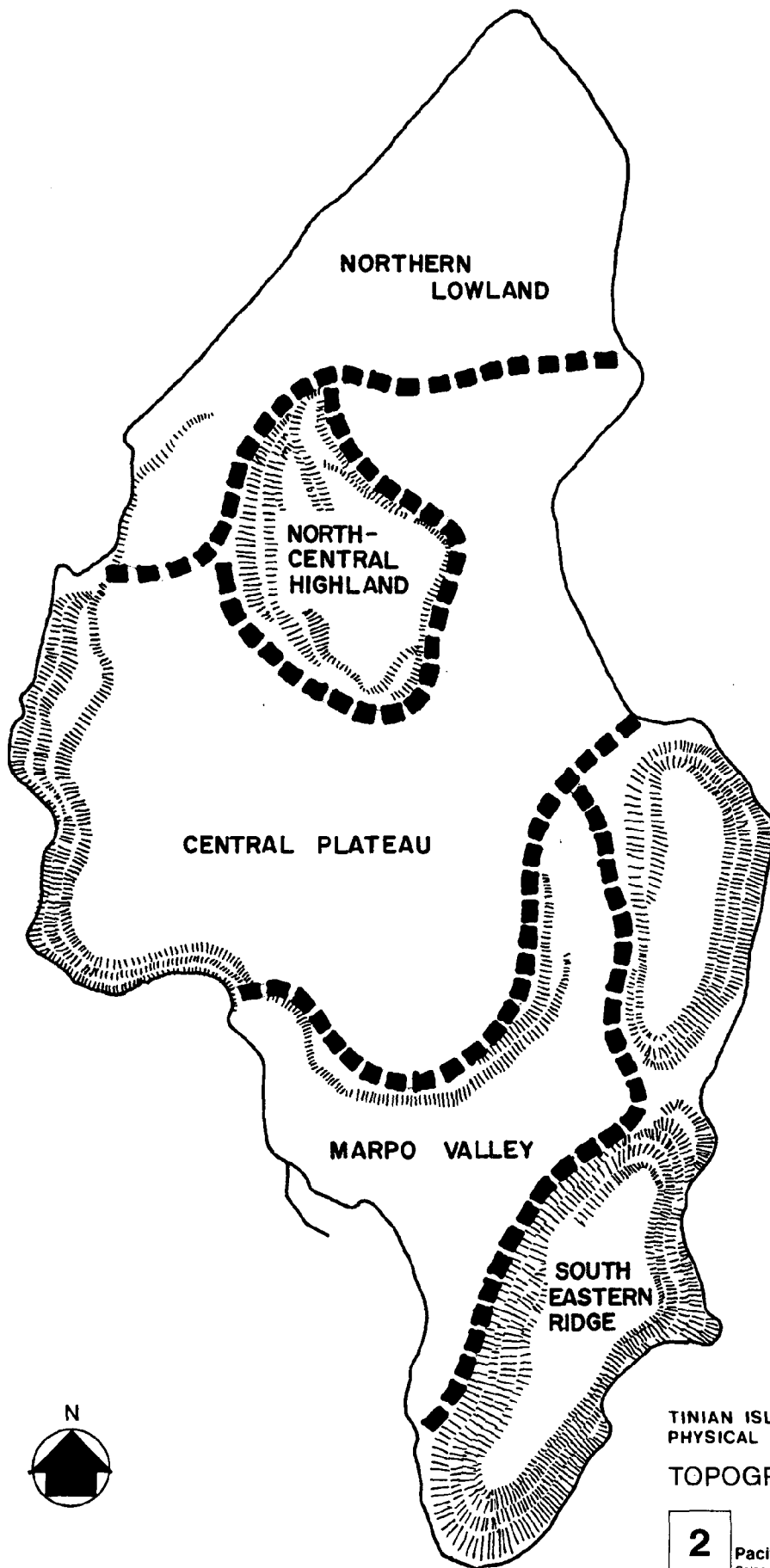
been so within the past 72 years. The islands southward of Anatahan are volcanic in base, coral-capped, and evidence more prolonged evolution. Barrier reefs tend to develop on the more gentle western slopes, while reefs closely fringe the shores on the east. The eastern coastlines are generally rocky and cliffbound and are characterized by wave-cut notches, sea caves, abrasion benches, and detached segments of the former shore (Doan, 1960).

TOPOGRAPHY

Tinian has a total land area of 39.166 square miles (25,066 acres). It is a relatively level island, exhibiting a greater percentage of flat area than other islands in the Marianas. It is the fourth highest in the southern Mariana Islands, including Guam. Puntan Carolinas, near Kanat Tadung, is the highest point on Tinian. It is 583 feet above sea level. Laderan Lasso, situated in the North-Central part of the island, is the second highest point with an elevation of 533 feet. The two highlands are separated by several miles of flat to gently sloping lands. The relief of the island is minor in overall character. It has a very low elevation, which gives the island a flat almost monotonous appearance from aerial and seaward views. Plateaus and terraces, generally tilted and separated by rocky escarpments, make up almost the entire island. Tinian is comprised of five physiographic units as shown in Plate 2. They include the Northern Lowland; North-Central Highland; Central Plateau; Marpo Valley (Median Valley); and Southeastern Ridge.

The Northern Lowland

This is a broad, flat, nearly horizontal surface with a very gentle upward slope from sea level on the west coast. A low, vaguely defined ridge at Sabanettan Chiget, a half mile inland from the east coast marks the upper boundary of the lowlands. This physiographic unit contains a shallow elliptical



TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
TOPOGRAPHY

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basin and includes Hagoi, a sea level lake. Southwest of Hagoi (lake), the northern lowland slopes moderately upward as a ramp and merges with the Central Plateau.

The North-Central Highland

The North Central Highland rises above the Central Plateau, midway between the east and west coasts of Tinian. Included in it are two principal marine limestone terraces, Laderan Lasso with an elevation of 533 feet and Laderan Mangpang ranging from 300 to 350 feet elevation, as well as a dissected mass of highly weathered volcanic rocks, ranging from 330 to 360 feet in elevation. By far, though, most of the highland area is marked with gentle to moderate slopes.

The Central Plateau

This land unit encompasses all of the middle and some of the northern part of Tinian. It includes lands extending northward on either side of the north-central highland. Scarps leading into Marpo Valley form the southern and eastern boundaries. The topography of the Central Plateau, ranging from 200 to 220 feet elevation, is fairly monotonous, with level to gently sloping lands. However, the slopes of the scarps bounding the plateau are steep and precipitous.

The Marpo Valley (Median Valley)

This valley is a low broad depression in south and east-central Tinian which separates the central plateau from the southeastern ridge. The divide, north of Laderan Dago, has an elevation of about 150 feet, the maximum for the unit. Slopes in Marpo Valley are gentle, and there is considerable horizontal land in the valley proper. The valley flanks, included in the central plateau and southeastern ridge units, have gentle foot slopes that merge with the valley floor. Sisonyan Magpo, located in the east-central part of the valley is a prominent and critical marshy area resulting from the subsidence or lowering of the land surface. At Sisonyan Magpo, the land surface approaches sea level and intersects the basal ground water lens.

The Southeastern Ridge

This is the highest part of the island. The elevation throughout this unit does not fall below 320 feet and reaches a maximum of 583 feet at Puntan Carolinas. It consists essentially of two flat-topped elongated limestone plateaus separated by a topographic saddle at Barangca and fringed by marine-cut terraces. The topographic saddle is interrupted by a large vertical-walled valley extending into Sisonyan Magpo. A large bay flanked to the north by a stubby peninsula is another prominent feature of this physiographic unit.

Relief in the southeastern ridge unit is greater than in any other part of Tinian. The 460 feet high precipitous seacliffs on the south-east coast near Castiyo are the most striking topographic feature of Tinian.

SOILS

Soils of Tinian are divided into four groups, based largely upon parent materials: soils on coral limestone; soils on volcanic rocks; soils on beach sand; and soils in swamps.

Soils Developed on Coral Limestone

These areas occupy 98 percent of the land area of Tinian. They are variable in color, texture and depth. Their characteristics depend upon the composition of the limestone, the age, and in some instance the amount of volcanic influence. Profile description shows variability, and the chemical properties vary with the physical properties. Soil depth over parent material is extremely variable but in many places it is sufficiently deep for the production of crops and pasture grasses. The soil profile generally exhibits dark to pale yellow colors and granular gritty clay to clay loam from the surface to approximately 10 inches in depth. From 10 to 20 inches the color is pale yellow, has coarse blocky structures, is medium plastic when moist, sticky when wet, and hard when dry. This soil is underlain by limestone bedrock.

Soils Developed on Volcanic Materials

These soils can be found at Banaderon Lemai situated in the North Central Highland. This area includes about 140 acres of land that are flat to gently sloping. The slope of this area varies from 5 to 25 percent. The surface soil is dark brown to yellowish brown and is slightly friable to plastic clay to a depth of about 25 inches. The soil below 25 inches is red and yellow in color, somewhat friable, and consists of partially weathered tuffs and andesitic material.

Coral Beach Sand

These soils occur in the south-west and at two small areas in the northwestern part. From the surface to a variable depth of 5 to 15 inches, coarse to medium textured sands are found. Underlying the surface sands are loose and coarse to medium textured coral sands of a gray to dark gray color which in turn are underlain by loose, coarse sands. The total land area where these sands occur is only 25 acres or 0.1 percent of the island.

Soils Developed under Swampy Conditions

These occur in the north-western part of Tinian at Hagoi. The water table is at or near the surface, and the water is reported to be "brackish." Another area where soils developed under swamp conditions is at Sisonyan Magpo within the Marpo Valley. The soil in these areas consists of dark gray, sandy clay loam and clay. In limited areas such as Sisonyan Magpo, the material borders on being a mulch due to the high percentage of organic matter. The total area where soils developed on swampy conditions is 64 acres or approximately 0.3 percent of the total land area.

CLIMATE

The climate of Tinian and its neighboring island of Saipan is tropical marine; uniformly warm and humid. Wind and rainfall

are the most variable elements, while humidity, temperature and pressure remain fairly constant throughout the year.

Climatically, the year falls into two seasons having very little temperature variation but pronounced rainfall differences. July through October is the rainy season. More than 50 percent of the yearly precipitation, or about 45 inches, falls within this period in the average year. In contrast, during February through April, rainfall averages less than 10 inches. November through January and May through June are transitional seasons which may be wet or dry depending upon the particular year. The dry season is the time of essentially continuous north-east trade winds. During the rainy season, winds tend to the east and southeast. Average annual wind velocity is 10.5 mph.

The ordinary range of relative humidity is from 60 to 100 percent with values commonly between 60 and 70 percent in the warmth of the afternoon and between 85 to 100 percent during the coolest hours just prior to dawn.

The average temperature for Tinian is 80°. The annual range is small, about 4° F and the diurnal range averages 9° to 10°. The geographic variations in climate from one part of Tinian to another are too slight to be significant. On the hills a few hundred feet above sea level rainfall is somewhat greater than in the lowlands, and nocturnal temperatures are perhaps 1 to 2° F cooler. There is no great variety of microclimates; however, due to the relatively small size of Tinian, temperatures and humidity on open or exposed areas may differ noticeably from heavily foliated areas.

Two principal kinds of storms contribute markedly to the climatic character of Tinian: small-scale storms consisting of

thunderstorms and squalls; and large systems of tropical storms and typhoons. The small-scale disturbances may dominate an area of only a few square miles and may occur on Tinian at any time of the year. However, their frequency and character vary from the dry to the wet seasons.

Typhoon are tropical storms that are accompanied by winds of 65 knots or greater. Major tropical cyclonic disturbances frequently pass near or directly over Tinian. Although they have occurred in all months of the year, they are far more frequent during the rainy season. True typhoons with maximum wind speeds of 65 knots or greater pass on the average within 120 nautical miles of Tinian about two years out of three and within 60 nautical miles about one year out of three.

Although partly cloudy days are common on Tinian, ceilings are 10,000 feet or higher for more than 75 percent of the time. Fog and dense haze are rare and visibility exceeds 10 miles 90 percent of the time. Surface winds generally do not exceed 35 miles per hour except during typhoons or tropical storms.

GROUND WATER RESOURCES

Tinian is composed of permeable limestones 300 to 400 feet thick resting upon a relatively impermeable volcanic core. Ninety-eight percent of the surface materials consists of limestone; the remaining two (2) percent are volcanic rocks. Due to high permeability of the limestones, rain water percolates downward through the soils and limestone rock forming a fresh water lens above the salt water. The island has no springs or streams. Due to the flatness of the island, surface runoff is almost non-existent.

Some inhabitants collect rain water for drinking utilizing either fifty-gallon drum cans or concrete cisterns constructed during the time of the Japanese occupation. Generally, the population of Tinian is dependent upon groundwater to

supply present potable water needs. Although some 40 wells were drilled by the American forces, only two wells are producing today. One consists of a short infiltration gallery (Maui well) and the second is an old Japanese dug well.

It is reported that peak production during 1944 was 2.3 million gallons daily including water produced by the Maui well, the Japanese dug well, and several unspecified drilled wells. It is reasonable to assume that present consumption which averages less than 1,000,000 gallons per day for all uses could be increased. The Ground Water Report in the Military Geology of Tinian suggested that a production rate of 2 million gallons daily was a reasonable estimate of the minimum available resource. Before increasing production, further investigation is necessary to determine the sustainable yield of the resource.

Two primary water sources are available, both are associated with island wetlands. Hagoi to the north has generally provided water of variable quality, with chlorides exceeding 600 ppm when heavily pumped. Sisonyan Magpo and its associated wells (Maui well and the Japanese dug well) has continued to provide water with less than 150 ppm of chloride since World War II.

VEGETATION AND WILDLIFE

It is generally assumed that the island of Tinian was heavily forested when first discovered by western explorers in the sixteenth century. It is probable that the introduction of cattle, swine, cats, goats, horses and poultry by the Spanish administration and the intensive sugar cane cultivation during Japanese occupancy exterminated many species of native flora and some species of the native fauna.

With the advent of World War II, additional ecological disturbances affected Tinian. The Japanese moved in troops and fortified parts of the island. The Americans invaded the island

in 1944 after causing considerable destruction to the Japanese installations and some of the landscape through bombing and naval gunfire.

Following departure of the U.S. military forces in 1948 the island became overgrown with Tangan-tangan (Leucaena glauca), common ironwood (Casuarina equisetifolia) and weedy plants which were able to grow well in the disturbed limestone soils. The recent return to extensive cattle grazing (several thousand head) again affects the island ecology.

Today, approximately 60 percent of the island is covered by leguminous tangan-tangan, 20 percent by different species of grass, napier grass and pasture, and 19 percent by mixed trees, shrubs and vines. Trees comprising the mixed forest are mostly of tangan-tangan, ironwood and formosan koa (Aca-cia confusa). The remaining one (1) percent of the island is covered by coconut forest (Cocos nucifera).

Tangan-tangan occurs everywhere on the island except on areas cleared for crop production, areas presently under cultivation, and in coastal areas where vegetation is mostly small grasses and vines. Papaya trees (Carica papaya) are growing wild along the roads and also in thick vegetated areas throughout the island. Ripe papaya is a source of food for wild birds and coconut crabs.

The vegetation in the two swamp lands on the island is primarily marsh reed (Phragmites karka) and hibiscus trees (Hibiscus tilliaceous). There are also several banana (Musa paridosiaca) and breadfruit (Artocarpus communis) trees growing nearby.

Terrestrial fauna is limited in the Mariana Islands. Most of the original fauna of Tinian probably still remains but in greatly reduced numbers due to extensive alterations to the former ecological environment. The only mammals native to

the Mariana Islands are the fanihi or fruit bat (Preropus mariannus) and a second species of small insectivorous bat (Emballonura semicaudata). Deer was introduced into Tinian in the early 1960's and have since increased considerably.

The giant African snail, several species of rats, and the garden slugs pose the most threat to vegetation. These animals, along with other harmful insects, are considered pests because they inflict extensive damage to crops and other vegetation. The monitor lizard which preys on chicks and eggs of both domestic and wild birds, is another harmful animal on the island. It has been reported that the monitor lizard occasionally feeds on coconut crabs. This lizard can attain a length of 6-1/2 feet and weigh up to 15 pounds.

Some 27 species of birds have been previously reported in the scientific literature as occurring on Tinian. Three species - the Micronesian Megapode, Marianas Duck and the Marianas Fruit Dove - are considered quite rare. The Marianas Mallard (Anas oustaleti salvadori), endemic to Guam, Tinian and Saipan, is presently on the U.S. Fish and Wildlife Endangered Species List. In Tinian, this bird has been known to inhabit the Hagoi (lake). The Micronesian Megapode (Megapodius laperouse) may have already become extinct on Tinian.

SOCIO-DEMOGRAPHIC SETTING

HISTORICAL CONSIDERATIONS

Accurate records concerning the people of Tinian were non-existent at the time the island was first discovered by western explorers in the sixteenth century. However, Tinian has extremely valuable archaeological sites, particularly in the harbor area and at other remote sites scattered about the island. The most prominent of the pre-historic relics in the Marianas are the prismatic shafts of rock surmounted by cup stones (Lattes) which were set in double rows with between four to six stones in each row.

Under Spanish rule from the 16th to the onset of the 20th century, the island of Tinian was depopulated (as were most of the Northern Marianas Islands) when the inhabitants were transported to either Saipan or Guam. Those on Saipan were later removed to Guam. The Spanish used Tinian as a game preserve and most probably during their tenure introduced cattle, swine, goats, horses, and poultry. Also during this long Spanish period many new plant species were introduced both intentionally and accidentally from other parts of the world.

In 1865 an Irishman leased the island and brought in 250 Carolinians to hunt cattle and pigs, collect trepang and to raise fruits and vegetables. These products were exported to Guam and used for the provisioning of trading vessels. Despite initial success the project was abandoned.

The German Administration, from 1899-1914, was interested in agriculture and planted coconut, citrus, and other tree crops. Most of the tree crops found on Tinian today were probably introduced during this period. The German period of occupancy, however, was too short to leave much imprint upon either the people or the landscape.

The Japanese between 1914-1944 established sugar cane plantations over much of the island. One estimate of land in sugar cane production was 58% of the total area. During this period, the population of Tinian (20,000 by 1941) was almost entirely Japanese, Korean and Okinawan. With the advent of World War II, the Japanese moved in troops and fortified parts of the island.

In 1944 the Americans invaded Tinian causing considerable destruction to the Japanese installations and some of the landscape through bombing and naval gunfire. Following its capture, the Americans then moved onto the island and built docks, barracks, airfields, roads and ancillary structures. Estimates indicate that the military population exceeded 100,000, and during preparation for the anticipated invasion of Japan, as many as 250,000 military personnel may have been on the island. Following the end of the war the American military departed Tinian and the island remained essentially vacant, until 1948.

In 1948 some 400 Chamorros who had been living on Yap during Japanese occupation were moved to Tinian and established permanent homes there. The Chamorro population has now increased to about 900 persons (1978 estimated population). Today, as in the past, the major occupation continues to be farming.

In the 1960's an outside organization, the Micronesian Development Corporation (MDC), leased major portions of land on the eastern parts of the island for a cattle ranch.

POPULATION

In the 1973 Trust Territory census, a total of 691 Trust Territory citizens were residing in Tinian. The remaining population of 23 is attributed to temporary alien workers and expatriate U.S. citizens. The estimated 1978 population is 900 persons.

To establish the most probable range for the future population of Tinian during the planning period, growth rates of 3% and 6% have been extrapolated forward from the estimated 1978 population of 900. Based on this assumption, the civilian population of Tinian by 1990 should range between 1200 and 1800 persons (See Figure 1).

These projections assume no military build-up and refer only to the indigenous civilian population. Should the military establish the proposed Tinian base, the island civilian population would be significantly higher. This induced population growth would be largely due to the increased economic activity associated with the development of the base.

POLITICAL CONSIDERATIONS

Tinian, more so than the other islands within the Marianas, must consider in its overall physical planning effort the potential impact of military presence. Under the provisions of the Technical Agreement, part of the Covenant to establish a Commonwealth of the Northern Mariana Islands, 17,799 acres (7,203 hectares) of Tinian will be leased by the United States for defense purposes.

The Technical Agreement contains terms relating to the lease-back or joint use of land and property, the joint use arrangements for San Jose Harbor and West Field, and the principles which will govern the social structure relations between the United States military and the Northern Mariana Islands civil authorities. General analysis of the Technical Agreement as it relates to specific plan elements are to be included in the overall master planning effort. The Technical Agreement in its entirety is included as an appendix to the plan.

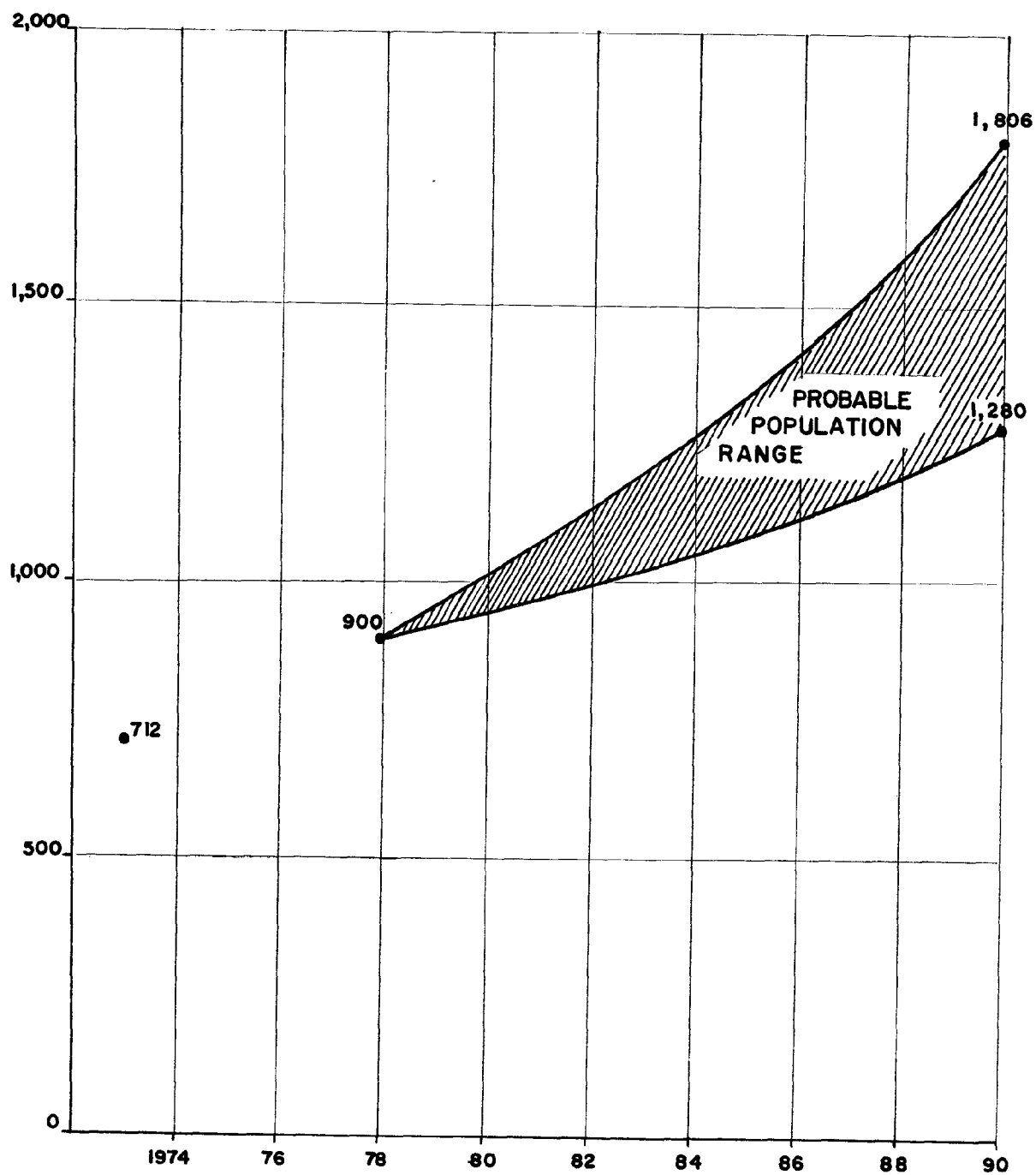


FIGURE I • MOST PROBABLE RANGE OF POPULATION GROWTH
ON TINIAN

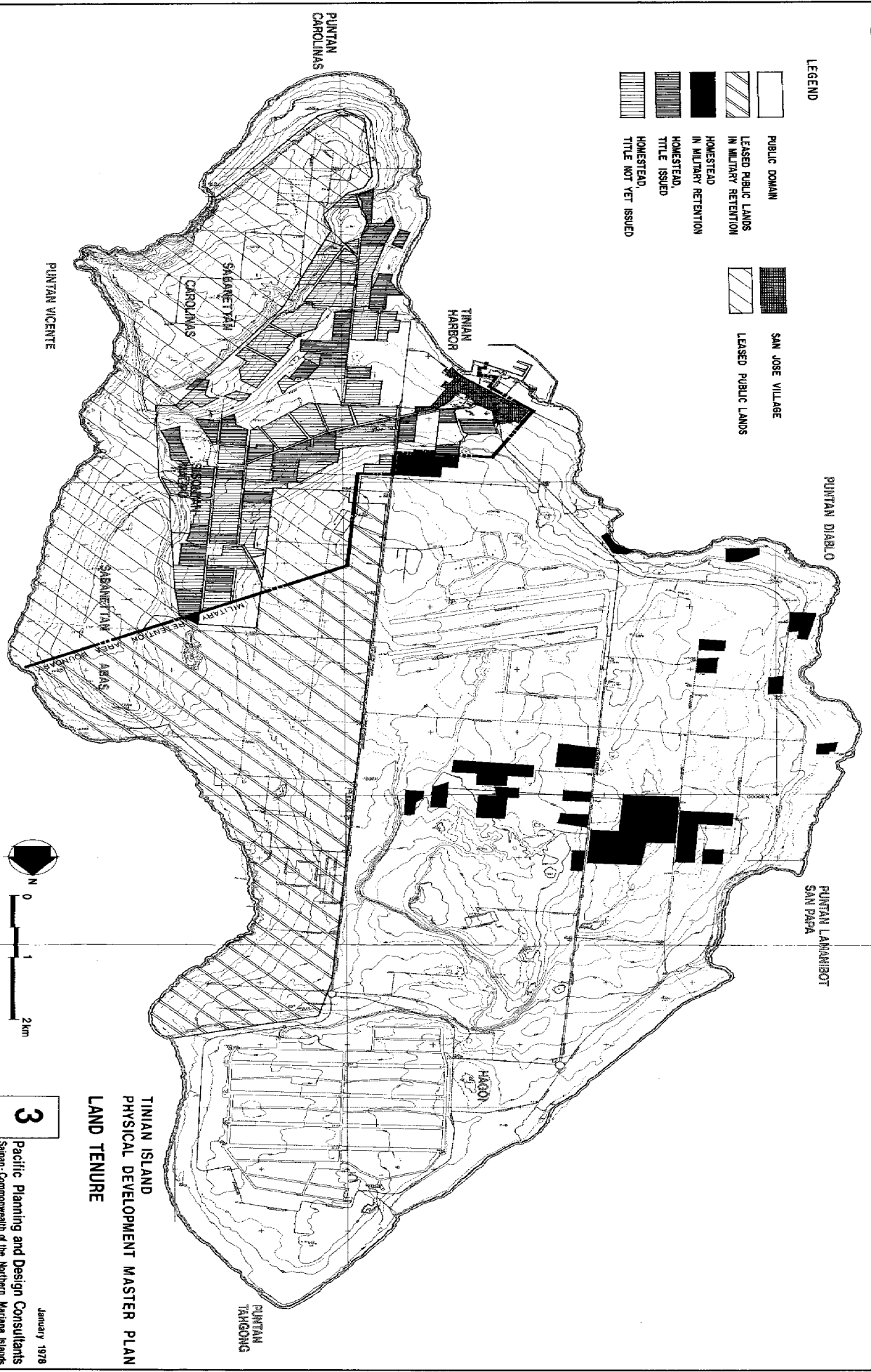
LAND MANAGEMENT FACTORS

At the close of World War II, the entire island of Tinian was in the public domain. The island had been a vast sugar cane plantation during the Japanese tenure, operated and managed by Japanese or Okinawan nationals. Upon the cessation of hostilities, the island was occupied by the U.S. Armed Forces. In the 1950's, the Naval Administration initiated the first issuance of land through a controlled homesteading program. Consequently, unlike Saipan and Rota, the land ownership problems caused in part by the war and previous administrations do not exist on Tinian.

Today, large tracts of land are still in public ownership. The majority of Tinian's 900 inhabitants farm agricultural homesteads or occupy village homestead sites, which have been acquired since 1950. The initial homesteading program resulted in the issuance of 20 agricultural homesteads by 1960. Since 1960, the homesteading program has continued and to date the government has granted 89 agricultural homesteads to the people totaling approximately 245 hectares. An additional 148 agricultural homesteads, each 2.5 hectares in size, have recently been "permitted" in the Marpo Valley area. (See Plate 3).

In addition to the Agricultural Homestead Program the government has cleared and opened an area of 72 acres in Marpo Valley, which is locally called the Cooperative Farm. The area is served by an irrigation system which is utilized by farmers during the dry season.

San Jose is the only village on Tinian and most of the island's population resides there. There are 158 homes in the village with an average lot area of 1/4 acre. All public facilities such as the administration building, hospital, municipal building, Tinian school, power plant, and post office are situated on the 206 acre tract, which generally defines the village site.



**TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
LAND TENURE**

In July 1976, an area of approximately 34 hectares, situated east of the existing village, was designated for Village Homesteads (District Law No.4-203). Subdivisions of this land has recently been initiated and is expected to be completed by February 1978. Additional residential lands totaling 20 hectares have been requested by the Mariana Islands Housing Authority (MIHA).

Eleven individuals and one major company are presently leasing grazing lands totaling 3,420 hectares. The bulk of grazing land is being leased by Micronesian Development Company, Inc., which has leased 3,086 hectares or slightly more than 7,500 acres. Mobil Oil of Micronesia is also leasing approximately 2 acres of land for sale and storage of petroleum products.

MILITARY RETENTION LANDS

Per the Technical Agreement signed on February 15, 1976, 17,799 acres (7,203 hectares) of Tinian will be leased by the United States for defense purposes. A total of 2,614 hectares (6,458 acres) will be available for leasebacks (see Technical Agreement Part 1, Section 5, in Appendix 1). Lands south of West Field including the harbor are available for leasebacks. Lands presently being leased by MDC which lie in Military Retention Lands, totaling 4010 acres north of West Field and East of Broadway, would continue to be available to the company under the terms of the present lease agreement.

There are presently 41 deeded homesteads totaling 204 hectares (503 acres) within the military-leased land. The technical agreement makes provisions for continuing leases on a case by case basis for five years, however, eventually the owners of these parcels will either have to be relocated or compensated for their lands. Relocation of these homesteads to lands outside of the military area cannot be accommodated within lands

presently available for the homesteading program. One or a combination of the following actions will be required to meet this obligation: cash purchase of fee simple title, requiring no government relocation; continuation of five-year renewals, allowing for the temporary occupancy of military lands by the present land owners; or relocation by the Government to new homestead areas. It should be noted that suitable lands for homesteads on Tinian are extremely limited with the exception of lands now leased by MDC.

Eventually, termination of the existing MDC lease agreement would be necessary if a program for continuous Agricultural Homesteading on Tinian is adopted by the new government. It is therefore suggested that MDC be restricted from the further construction of permanent facilities which could otherwise be located on lands in the public sector zoned for such purposes. New or permanent facilities that are industrial or commercial in nature should be located on lands zoned for such purposes, thereby increasing the possibility for their adaptation into future land use plans.

LAND USE

PURPOSE AND OBJECTIVES

PROPOSED LAND USES

PURPOSE AND OBJECTIVES

The land use plan should provide a framework for the management of change and future growth. The plan should be sensitive to environmental constraints and the availability of resources. Of necessity the plan should respect the traditional life-style of the local citizens, their desire to own property, to have decent housing and to actively shape the future of Tinian through individual choice of style and expression of preferences. More so than on the other islands of the Marianas, land use planning for Tinian must be cognizant of anticipated military activities. Objectives pursued in the development of the Master plan for Tinian are the following:

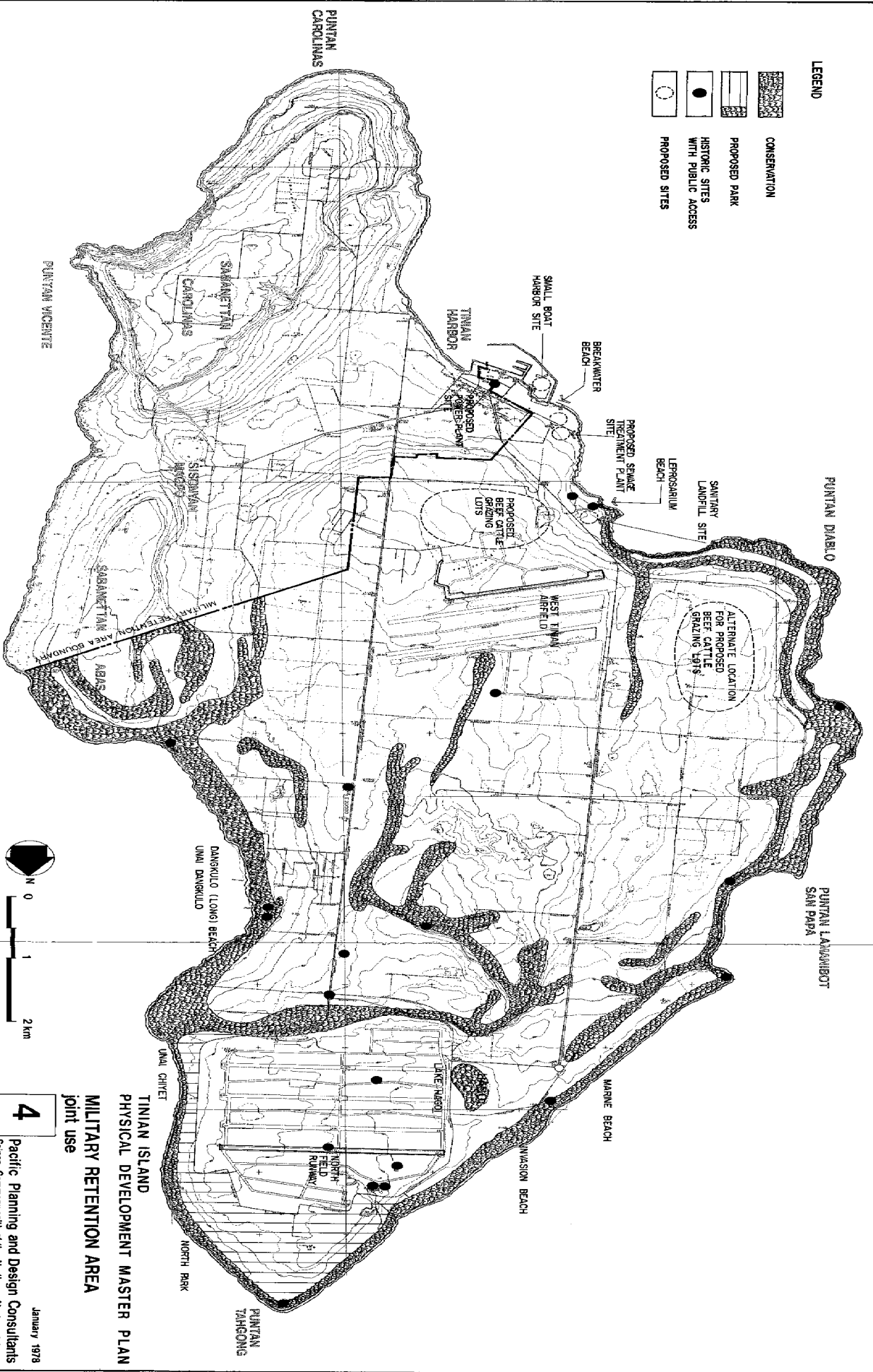
- * To recognize and respect the traditional life style and the desire to own and occupy land;
- * To encourage the location of development in areas most suitable for development due to soil conditions, water table level, vegetation type;
- * To recognize natural environmental constraints, water topography and soils in the dimensioning and location of future growth and to preserve and conserve land with valuable ecological characteristics, recreation uses, or scenic appeals;
- * To coordinate urban growth with the availability and growth of public services including water, power, transportation facilities and sewer;
- * To encourage agriculture as a viable economic use of suitable land;
- * To encourage development patterns which enhance living conditions by clustering compatible land uses and separating conflicting ones;

- * To maximize public ownership and access to beaches and estuarine lands to insure their preservation, conservation or greatest public use;
- * To provide or allocate suitable and sufficient sites for residential, business and industrial needs to meet the anticipated growth.

In order to realize these goals, seven major zones are proposed for land usage on Tinian: Conservation; Agriculture; Residential; Commercial; Industrial; Hotel-Resort; and Public Facilities. Agricultural and Residential zones are further subdivided.

It should be noted that these zones apply only to those lands under civilian control as determined in the Covenant. Plate 4 depicts the boundary between military retention lands and the civilian areas. Because of the necessity to make certain facilities, such as the airfield and beach parks, available for both civilian and military uses, joint use of these facilities has been arranged through the Technical Agreement. These facilities are also shown on Plate 4.

The zones appropriate to the civilian sector, and the lands within them are discussed in the following section. Plate 5 is a graphical depiction of the proposed land uses. See Plate in pocket.



**TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
MILITARY RETENTION AREA
joint use**

4

Pacific Planning and Design Consultants
Saipan, Commonwealth of the Northern Mariana Islands
January 1978

PROPOSED LAND USE ZONES

CONSERVATION

The Conservation Zone provides for the preservation and protection of natural resources such as watersheds, unique animal and plant habitats, historic and cultural resources, scenic resources including prominent topographic forms and features, and outstanding views and attractive wilderness areas. The Conservation Zone also establishes a mechanism to preserve unique geologic or vegetative sites such as steep offshore reefs and lagoons, beaches, beach parks and general parks.

Geographic Areas

With exception of the village of San Jose, much of Tinian lands are in vast open spaces. Areas designated for inclusion in the Conservation Zone include shoreline areas and beaches. Further included are all the inland areas with rugged topography. Generally soils on steep limestone cliffs are unsuited for agriculture and at present support the last remnants of the original vegetation cover. Puntan Masalog, Castiyo, Carolinas, Diablo, and Tadung are all included in the Conservation Zone.

Two wetlands are designated conservation lands. The northern wetland referred to as Hagoi lies within the Military Retention Lands. Hagoi (lake) with its surrounding marshy area covered extensively with marsh grass (Phragmites karka) is about half a mile long and one-fifth of a mile wide. The lake is known to be a habitat of the Marianas Duck, a species now included on the U.S. Fish and Wildlife Departments "Endangered Species List".

Marpo Swamp (Sisonyan Magpo) covers an area of similar size. It lies in the Marpo (Median) valley and is presently the potable water source for the islands population and also provides water for irrigation. The swamp is overgrown with a thick, almost impenetrable, tangle of hibiscus trees. Clumps of bamboo

and several breadfruit trees are situated on the swamp edge. Sisonyan Magpo warrants inclusion in the Conservation Zone in order to protect the potable water supply.

Agriculture lands adjacent to the swamp should be controlled to make certain that pesticides and inorganic fertilizers are not introduced into the water source.

Historic Sites

Twenty-seven historic sites have heretofore been identified. These include World War II relics, Japanese shrines and monuments, and Latte sites.

Latte sites are prominent prehistoric relics. The San Jose Village site (Taga House) near the harbor contains the largest of all standing latte structures discovered in the Marianas. The quarry from where the stones were carved lies about 1/2 mile to the east.

Paintings strongly suspected of being prehistoric have been identified in two caves along the western coastline. Numerous latte sites also dot the coastline and beach areas.

North Field, home base for the B-29's which carried the atomic bombs dropped on Hiroshima and Nagasaki, has two memorial plaques marking the loading pit locations.

Appendix 2 lists and describes all the historic and archaeological sites that have been identified to date on Tinian.

Several park areas are also included in the Conservation Zone. They include North End, South End and Long Beach Park areas. These sites are later identified in the section on Public Facilities.

AGRICULTURE

Two agricultural zones are designated in the Master Plan. Agricultural Zone 1 includes those lands to be used for intensive cultivation of field crops, orchards, and forage. Lands included in this category contain the most productive soils which in many instances overlay valuable ground water resources. The purpose of the Agricultural Zone 1 designation is to make certain that fertilizers and pesticides are controlled to avoid polluting ground water resources. The Agricultural Zone 2 provides land for grazing activity, subsistence croplands and uses related to animal husbandry, including the raising of cattle, swine, and poultry.

Agriculture-Cultivation Zone (A-1)

Approximately 140 acres have been designated as Agricultural 1 lands, including the Cooperative Farm area and lands immediately west and north-west of Sisonyan Magpo. Much of the land herein was recently subdivided into 2.5 hectare homesteads, and can be made more productive by expansion of the existing irrigation system.

The main purpose of this zone is to protect this area from non-agricultural uses and potential threats to the watershed. A number of criteria must be followed which have been explicitly outlined in the proposed Zoning Ordinance, the implementation tool for this plan. Generally, these criteria restrict land use in this zone to intensive cultivation. Single family residential as well as grazing are permitted uses in this zone. Lot size for residential use must be at least one hectare.

In order to protect the quality of the water supply the requirements of the Conservation Zone, prohibiting private wells and the use of certain fertilizers and pesticides, shall be applied.

Agriculture-Subsistence/Grazing Zone (A-2)

This zone identifies the areas best suited for grazing and subsistence agriculture and accommodates these as principal uses. Single family residential uses on minimum lot size of one (1) hectare per residential unit are also permitted.

Conditional uses can be accommodated in this zone, subject to performance standards covering impacts upon social and natural environments and public facilities. The designation of areas as grazing lands implies that the ideal land use in these areas should be for large-plot cattle grazing. Grazing uses shall conform to sound agricultural practices and avoid overgrazing, a condition invariably leading to erosion or loss of soil productivity.

Grazing lands or subsistence agriculture are zoned for most of the flat lying coralline soils on the Carolinas and Masalog plateaus. This includes much of the land presently under lease by MDC lying within lands which will remain in public domain. Extensive portions of the Marpo Valley have also been classified as Agriculture 2 lands suitable for grazing and subsistence farming. With extension of the irrigation system northward up the Marpo Valley, some of this land will be suitable for cultivation.

RESIDENTIAL

The Master Plan delineates two residential zones based generally on density of development.

The Rural Residential Zone provides for residential development together with compatible agricultural uses generally characterized by "small farms" or "subsistence lots". This zone may lack basic essential services normally required for urban zones. Areas zoned rural residential may eventually be suitable for more intense urban uses. However, redesignation during this planning period would be premature with respect to other urban areas and/or provision of adequate infrastructure to support such development.

The One-and Two-Family Residential Zone provides areas for low density family living, privacy, a reasonably amount of open space, and protection from noise, congestion and hazards that may result from incompatible land uses such as commercial or industrial. Uses include one and two family dwelling units, incidental and subordinate commercial or personal services such as "mom and pop" stores, home occupations, schools, parks, playground and recreational areas.

Village Plans (One-and Two-Family Residential)

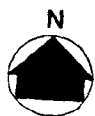
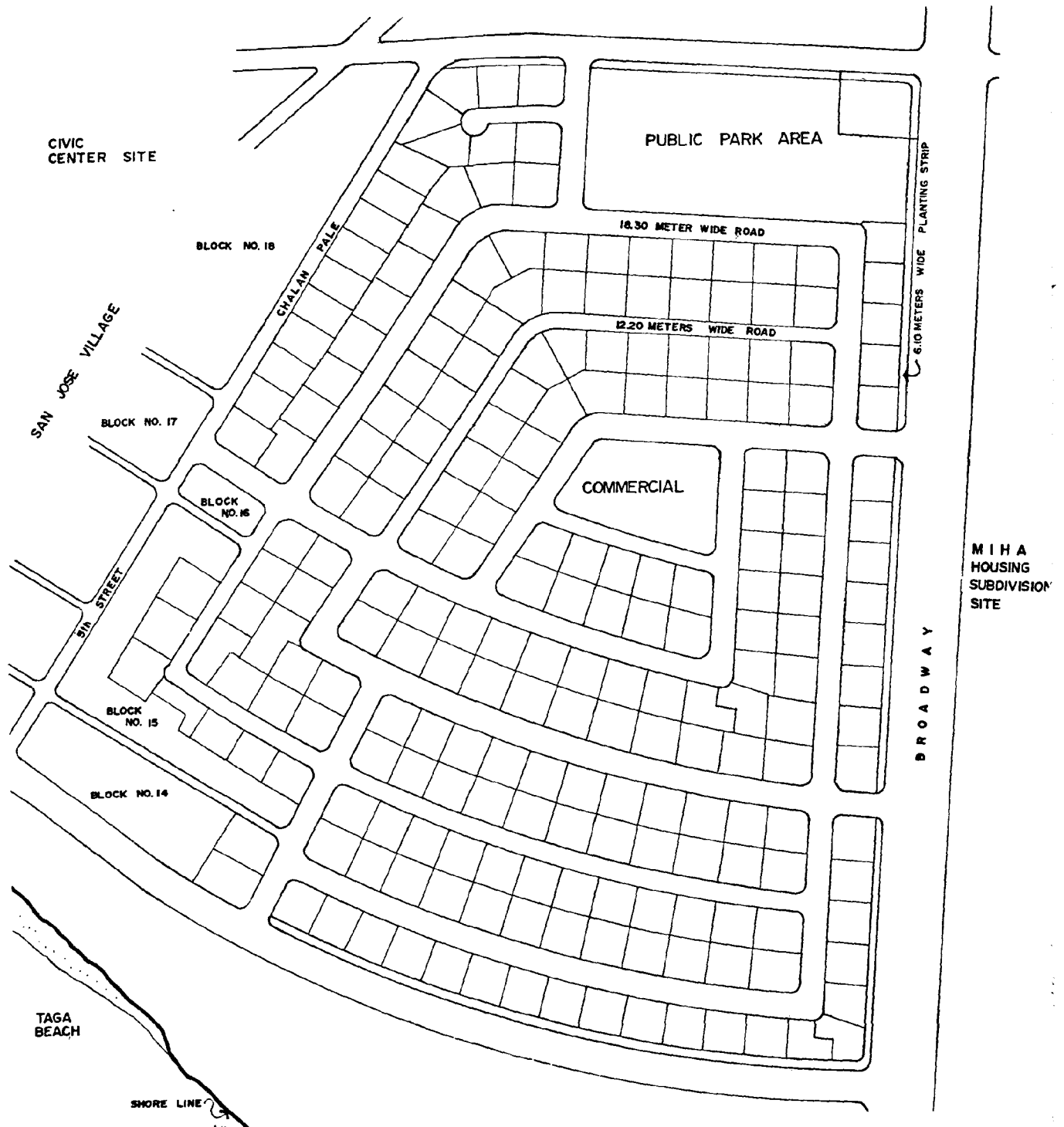
The existing 206 acre village of San Jose is basically residential; however, this area also includes the island's three hotels and several small commercial areas generally of a "mom and pop" variety. Public facilities include the power plant, administrative complex, post office and hospital. Plate 7 depicts the general land use scheme for the village. The existing village is a variant of one-and two-family residential which allows for continuation of small "mom and pop" commercial establishments and service stations. This type of commercial activity should be restricted to the existing central village area.

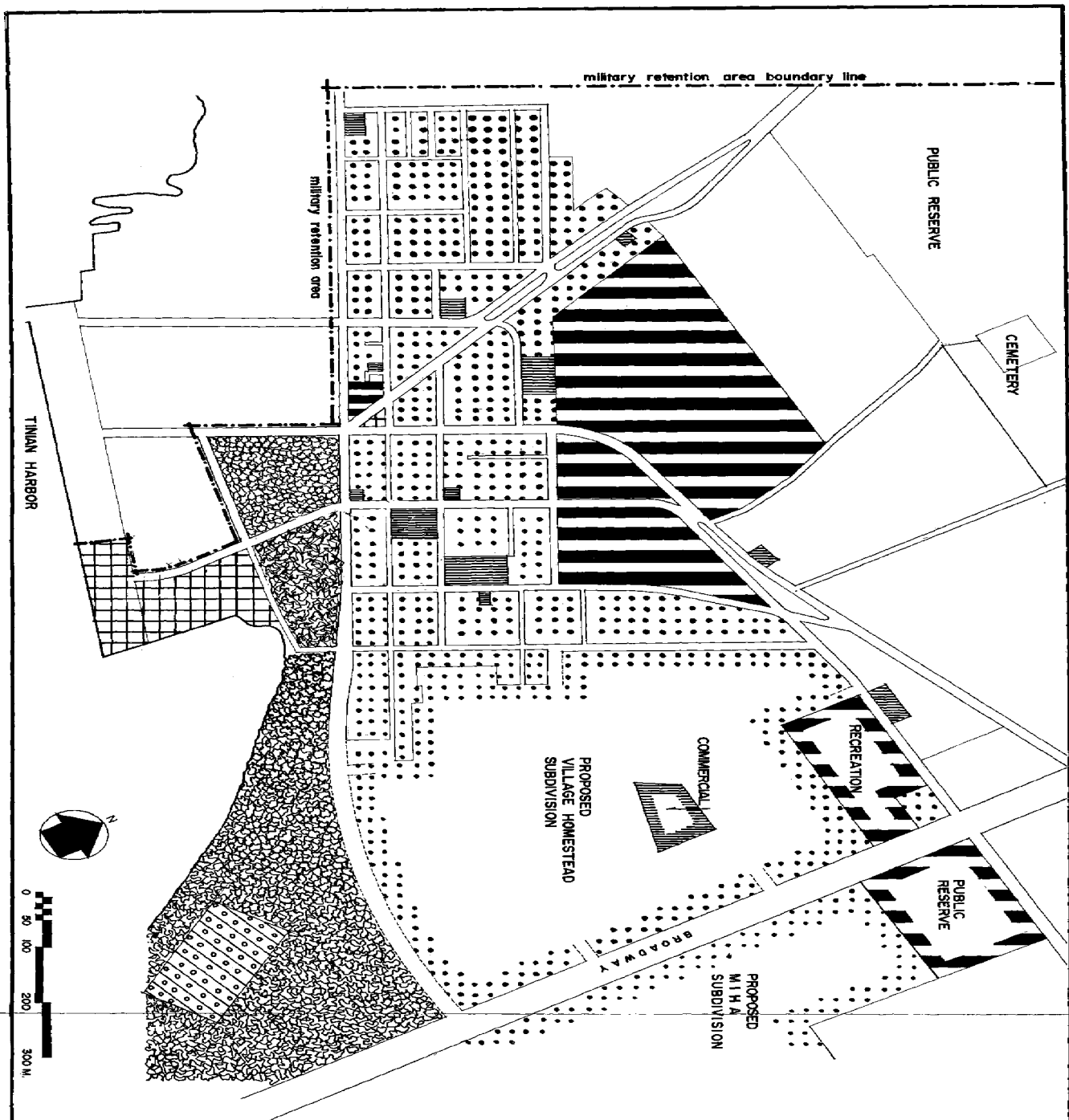
A new Village Homestead Subdivision of 224 lots (30 hectares) is being platted immediately east of the existing village. Lot sizes are approximately one quarter of an acre (See Plate 6).

A centrally located commercial area is proposed within the new subdivision and it is suggested that lands within the commercial area be leased so that control over the type and the extent of commercial activity rests with the government. The central village commercial area precludes the need for the establishment of "mom and pop" variety stores within the new subdivision.







Rural Residential

Approximately 100 acres are zoned for rural residential, i.e., lots of one-half acre or more. This land lies north of the existing village and public school site, and west of Broadway.





LEGEND

-  CONSERVATION
-  RESIDENTIAL
-  COMMERCIAL
-  RESORT
-  PUBLIC FACILITY
-  INDUSTRIAL

**TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
SAN JOSE VILLAGE
land use**

Presently land ownership is mixed, with almost equal portions in private and public ownership. It is suggested that public lands be kept in reserve during the short-range plan period as it is doubtful that additional house lots will be required. Development of this area beyond this planning horizon will require the development of infrastructure such as water, power, and roads.

An additional 20 hectares have been granted to the Mariana Islands Housing Authority for residential development. This property lies east of Broadway directly across from the village homestead lands. Plans and schematics for the proposed MIHA project are not yet completed.

COMMERCIAL-INDUSTRIAL

Commercial activities more intense than occasional services, retail establishments, and professional offices appropriate to the residential zones shall be located in zones designated either commercial or commercial-industrial.

The Commercial Zone provides for the concentration of personal service-related commercial uses more extensive than those occasionally found scattered within the residential zone. They may be in close proximity and easily accessible to nearby residential neighborhoods and may provide for compact one-stop shopping areas.

The Heavy Commercial-Industrial Zone shall provide for the location of major regional commercial centers. This includes commercial uses which are generally considered incompatible with residential areas. Lumber sales, construction material and equipment sales, warehousing, auto sales and repair are typical commercial activities that are to be located in heavy commercial zones. It shall also provide lands for light industrial uses and processing plants including sufficient space to meet expected future needs. These reserved areas would encourage orderly economic development while avoiding nuisance or potential hazards to residential areas.

Commercial

A small Commercial Zone 1.7 acres in size has been designated in the new subdivision to accommodate a one-stop shopping center and small offices. This parcel of land should remain in public ownership for lease to the private sector thereby allowing government control over the types of facilities developed.

Commercial-Industrial

A heavy commercial-industrial area is proposed for 12 hectares of land (29 acres) east of Broadway. This zone will accommodate major commercial developments such as automobile sales, lumber sales, and hardware stores. Light industrial or agricultural-related industrial activities would also be allowed.

This location has easy access to Tinian Harbor and also to the airport. These lands should remain in government ownership for lease to the private sector.

Industrial

Nine (9) acres of land near the civilian port area have been designated industrial in accordance with the Technical Agreement, which restricts utilization of these lands to harbor-and port-oriented uses. It should be noted that the nine (9) acre site includes the "Taga Daughter Well" a historic site which should be protected from destruction. A portion of the lands designated civilian harbor oriented lands would therefore be included within the conservation zone.

HOTEL RESORT

This zone provides for the establishment of facilities necessary to accommodate the needs and desires of visitors, tourists, and transient guests. It provides for compatible and complementary structures and uses in a unique resort setting. Permitted uses include hotels and accessory buildings customarily incident to hotel uses.

The existing hotel sites within the village are small and preclude the development of a first class hotel. A new hotel resort site is proposed for lands within the conservation zone south of the new village homestead area. Specific location and size of the site within this area should await development plans. The site is situated between Jones Beach (Taga House) and the Taga Quarry beach area. This site takes advantage of excellent vistas, nearby beaches, historic sites and easy access to and from the village.

PUBLIC FACILITIES/PUBLIC RESERVE

The Public Facilities Zone provides adequate space for the development and delivery of all necessary public services, including government and quasi-government facilities not in other land use categories, and lands reserved for future public use.

PUBLIC FACILITIES

INTRODUCTION

CIVIC CENTER

HEALTH FACILITIES

EDUCATIONAL FACILITIES

POLICE AND FIRE FACILITIES

PARKS AND RECREATION

HOUSING PROGRAM

AGRICULTURAL IMPROVEMENTS

INTRODUCTION

The Government of the Northern Mariana Islands has either by conscious choice or need found it desirable to provide facilities and services which in larger communities would be handled in large part by private enterprise. Education, administration, parks and recreation, and public safety facilities are commonly provided by most governments. In the Northern Mariana Islands, government has also found it necessary to become deeply involved in health care facilities, in the housing market and in economic development areas such as agriculture, fishing and tourism.

The following sections present details on the major public facility projects recommended during the plan period. Each is mentioned briefly below and is illustrated on Plate 8.

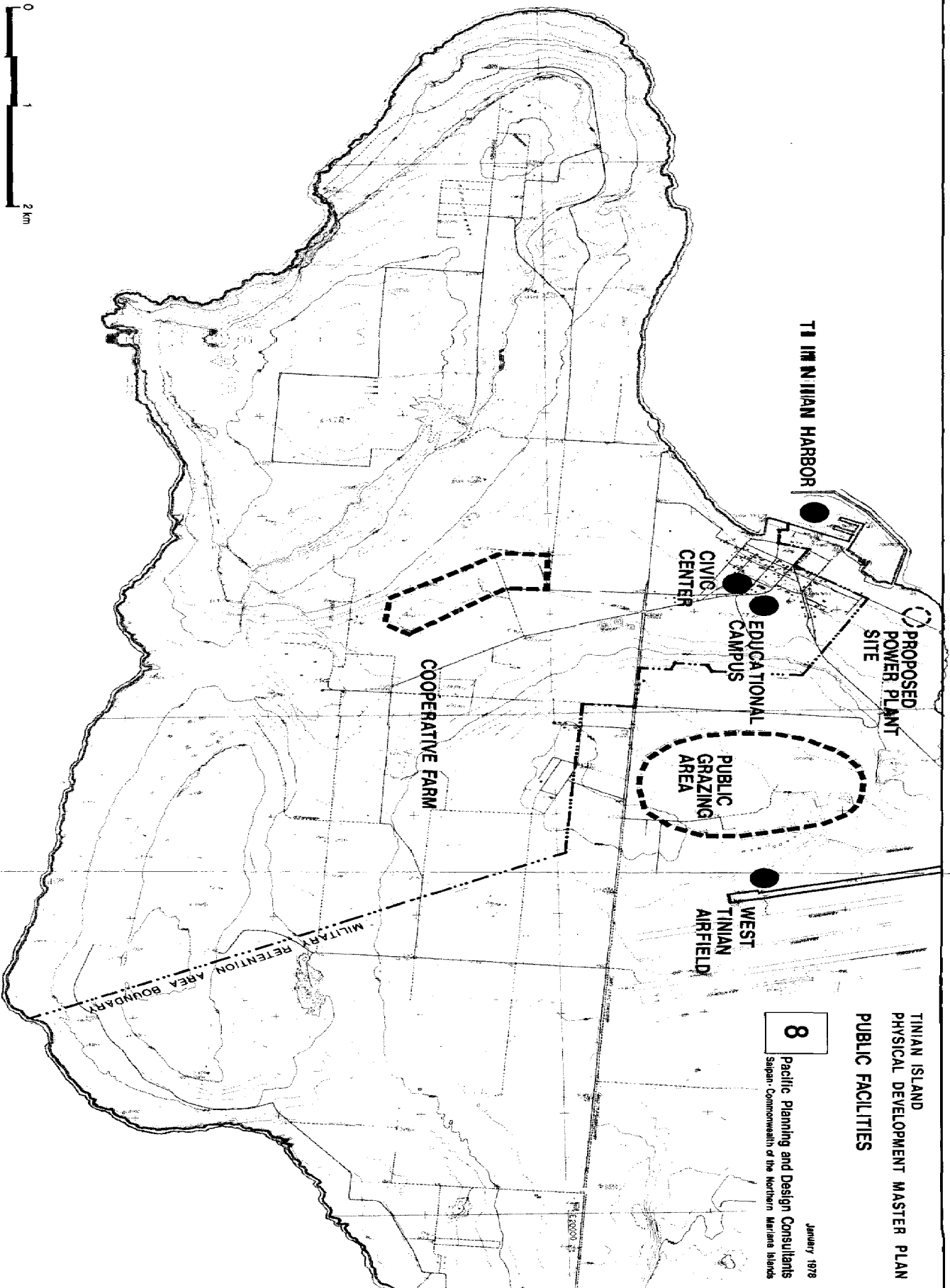
- * Expansion of existing civic center including the construction of a new police and fire station. Eventual construction of a new courthouse and administrative buildings.
- * Construction of an Environmental Health/Public Health addition at the civic center and the construction of a new Hill-Burton dispensary onto the existing medical facilities.
- * Expansion of school facilities at the present school site including the eventual establishment of a complete educational campus.
- * Improvements and expansion to recreational facilities at the educational center and the development of a new recreational complex in the new subdivision. Improvement of several beach parks.
- * Provision of site design and infrastructure support for the New Village subdivision and the proposed MIHA housing project.
- * Development of beef cattle grazing lots and expansion of the existing irrigation system.

CIVIC CENTER

The present civic center on Tinian is well situated and closely relates to nearby residential development and existing facilities such as the school complex and church. The present site accommodates the dispensary/hospital, the administrative offices, headstart building, community development office and the police station. Its location adjacent to the church and educational buildings allows for the development of a viable village center easily accessible by either pedestrian or vehicle.

In Plate 9, a schematic layout of the administration complex is illustrated. Phase 1 indicates the existing complex and the buildings which are anticipated to be completed during the short range plan. Phases 2 and 3 indicate successive steps of development that will make the center visually attractive and functional. The schemes presented also develop a new circulation pattern that eliminates the present safety hazards for vehicular traffic. Although not a problem today with the minimal number of automobiles on the island, the existing circulation pattern could precipitate traffic accidents when vehicle numbers increase.

During Phase 1 it is proposed that most of the existing buildings be retained. The present police station should be replaced and relocated to the northeast corner of the site. On this corner of the site, a police/fire station building should be constructed. Access to the fire station should be provided on both major roadways. Administrative offices presently housed in the Dispensary should be relocated to the structure housing the hardware store. The municipal building would continue to be utilized for administrative offices. The Community Development Office would remain in its present location although the possibility of relocating to one of the government houses north of the church should be pursued.



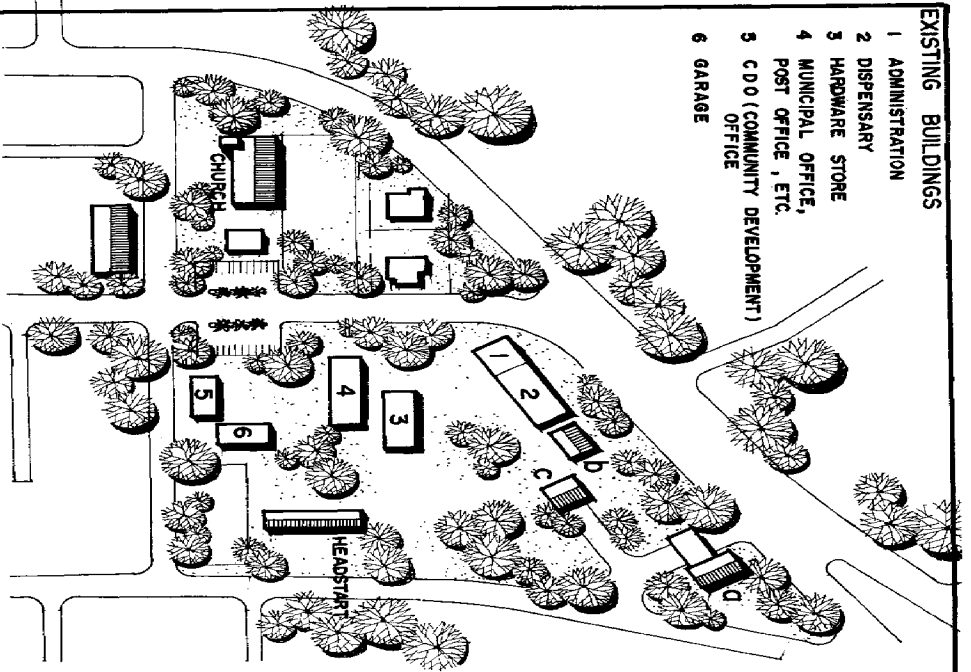
**TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
PUBLIC FACILITIES**

8

January 1978
Pacific Planning and Design Consultants
Saipan, Commonwealth of the Northern Mariana Islands

EXISTING BUILDINGS

- 1 ADMINISTRATION
- 2 DISPENSARY
- 3 HARDWARE STORE
- 4 MUNICIPAL OFFICE, POST OFFICE, ETC.
- 5 CDO (COMMUNITY DEVELOPMENT) OFFICE
- 6 GARAGE

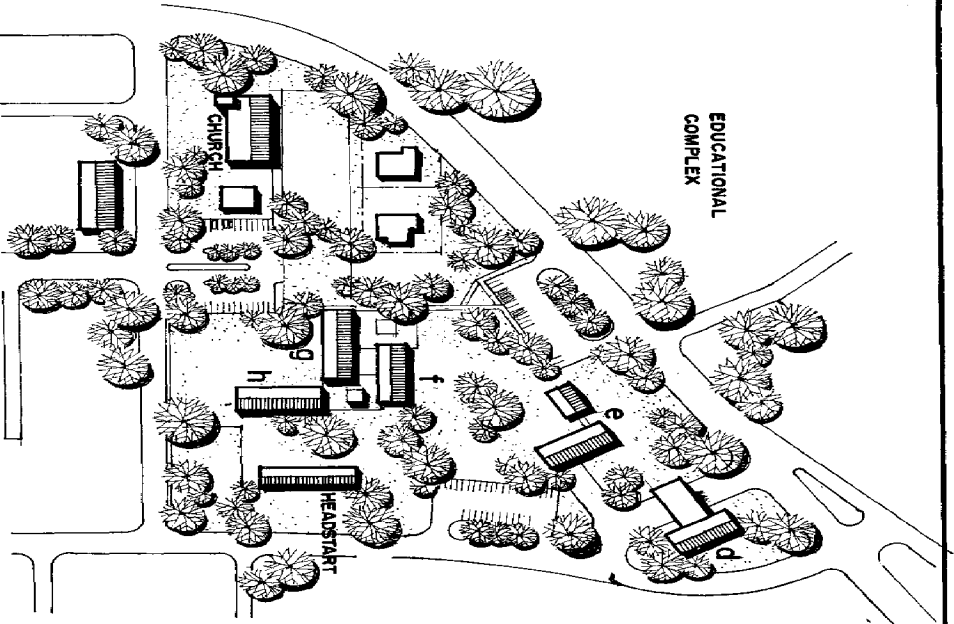


phase 1

Improvements

- a Police station
- b Public health
- c Public health

EDUCATIONAL COMPLEX

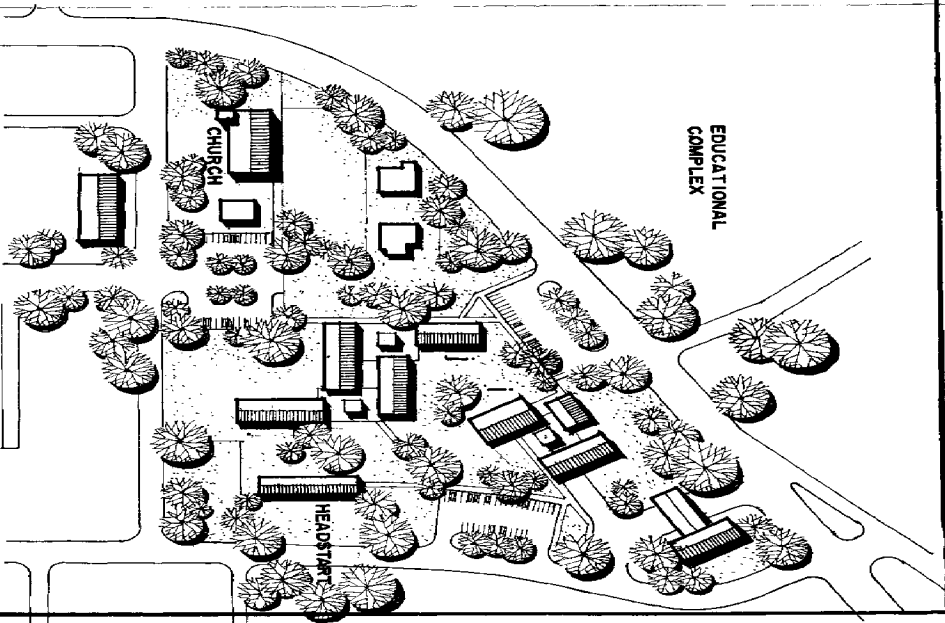


phase 2

Improvements

- d Fire station
- e Public health
- f Administration
- g Administration
- h Administration

EDUCATIONAL COMPLEX



phase 3

Improvements

- i Public health
- j Administration

TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
CIVIC CENTER
master plan

9

January 1978
Pacific Planning and Design Consultants
Sajon, Commonwealth of the Northern Mariana Islands

Two health facility buildings are anticipated to be constructed on the site during Phase 1. The first is a dispensary to be built in 1978 through the Hill-Burton program. The second would be a public health/environmental health building to be constructed in 1979. It is suggested that these buildings be located east of the existing dispensary.

In Phase 2, it is suggested that a new administrative building be constructed to house the courts. Further additions will be made to the Public Health facilities and it is assumed that the existing dispensary/administrative building will be removed.

The middle road, Taga street, should be closed to vehicular traffic within the civic center block, and major improvements should be made to the existing circulation pattern. Three parking lots, each with parking for 15 to 20 vehicles, should be developed on the perimeter areas of the site. The former police station site, the dispensary site, and a third site adjacent to the new Public Health buildings are potential public parking sites.

Phase 3 includes the construction of additional administrative buildings. Whether the present municipal building, identified as "f" in the schematic, would be retained depends on its condition. In any event, the administrative facilities should be renovated and expanded. The Civic Center's proximity to proposed school facilities allows for the eventual joint use of buildings, thereby eliminating the need to duplicate facilities. The auditorium and library are prime examples of school facilities that should be utilized for both educational and community needs.

The entire area should be landscaped to provide a visually aesthetic surrounding. Pedestrian access is necessary as the neighborhood of the civic center is residential. The overall layout should facilitate incremental construction and easy expansion of any buildings.

HEALTH FACILITIES

Presently, there is a dispensary/hospital building which shares facilities with the administrative offices of the Resident Commissioner Representative. This is considered to be a less than adequate arrangement and steps should be taken soon in the plan period to bring about relief to this situation.

In 1978 a dispensary will be constructed on Tinian under the Hill-Burton program. Monies have been programmed in 1978 and 1979 to construct an Environmental Health/Public Health addition. It is proposed that these facilities be located on the present Civic Center site. (See Plate 9 on page 43).

Resolution of the need, location, and size of a new hospital should be deferred pending observation of civilian population growth and probable military activity. With the proposed improvements scheduled for 1978 and 1979, additional major capital improvement projects for health facilities are thought to be unnecessary during the short-range planning period.

Under terms of the Technical Agreement, emergency medical care will be provided to all residents of Tinian when military hospital facilities are constructed. Non-emergency treatment will be provided residents of Tinian where civilian capability is non-existent. Such treatment is subject to the capacity and capability of the military and professional staff and availability of military health facilities.

EDUCATIONAL FACILITIES

Presently, the educational facilities on Tinian consists of four buildings occupying a small portion of a 24 acre (9.8 hectare) site. Two of the buildings are temporary structures.

Although it is not generally advisable to do so, the Tinian school site is compared herein to U.S. site spatial requirement standards. The comparison indicates that the site will be adequate to meet spatial requirements during the plan period.

By U.S. standards, an educational complex accommodating Junior and Senior High School students as well as general recreational facilities should be sited on at least 18 acres. Additionally, one acre per 100 students should be provided. An elementary school site should be a minimum of 5 acres for 230 pupils and one acre per 100 additional students.

For the seven year plan period, it is anticipated that the number of students in the Tinian School System will not exceed 600. This would mean a more than doubling of the present school population. Therefore, a school site accommodating all levels of education would require between 23 and 27 acres. The 24 acre Tinian school site, with proper landscaping and site design, should adequately accommodate any new school facilities that may be necessary during the plan period.

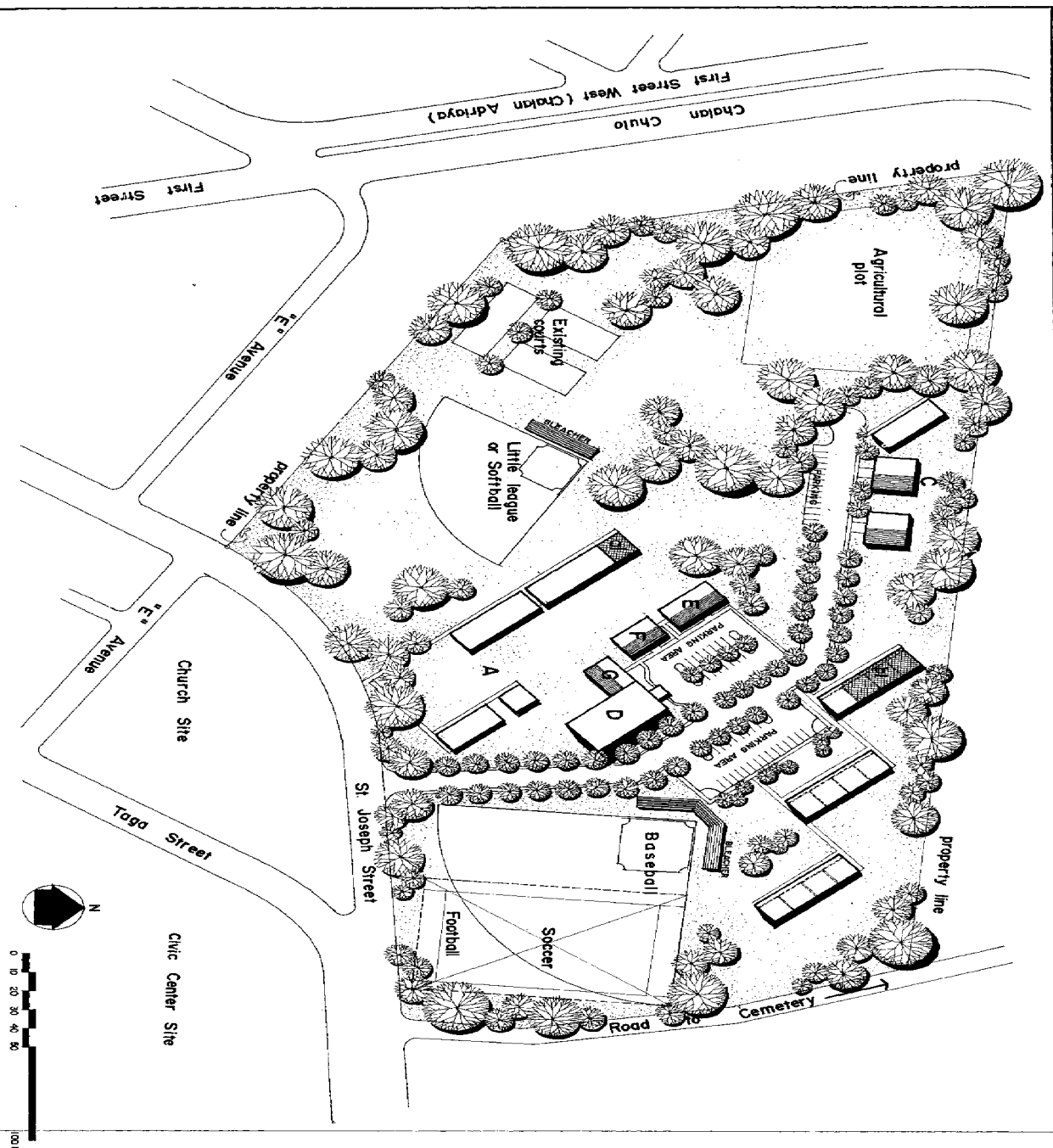
Two of the present structures appear to be adequate to meet facility requirements during the plan period. These structures were constructed with concrete block walls and sheet metal roofs, and with minor renovations and maintenance should remain useful. The two temporary structures which house the fifth grade and Junior High students should be replaced as their useful lives will have been expended by the end of the seven year plan period.

Education through the 9th grade level is available on Tinian. The present policy favors the addition of two classrooms every two years and the eventual construction of a complete high school on the island. In accordance with this policy, it is proposed that two (2) new classrooms and a Home Arts classroom be constructed in Fiscal Year 1978. Total funds allocated for this purpose are \$90,000 dollars. Proper siting of school facilities should begin during the next fiscal year with the construction of three new classrooms.

Plate 10 illustrates the Tinian Educational campus Master Plan. The following functional sub-areas can be recognized: A primary education complex; an area for secondary education; an area for a vocational education complex including agricultural plots; an area of existing outdoor recreational facilities; and an area for the proposed outdoor recreational facilities. Approximately \$1.0 million will be required for completion of the entire campus. Except for the \$90.0 thousand presently earmarked for the home arts and two regular classrooms, no identified funds have been provided during the plan period. Should some funds become available, the library and administration facility should be constructed. Approximately \$125.0 thousand would be required.

The direction of the prevailing breezes and the desire for physical separation between primary and secondary educational buildings make it desirable to locate the high school classrooms at the northeastern end of the site. The buildings are to be oriented perpendicular to the prevailing winds so as to take advantage of the breezes for comfort.

Within the plan period \$30,000 is allocated for school recreational facilities. It is suggested that these funds be used for the construction of a new baseball/football/soccer field. Its proposed location is closely related to the Civic Center taking into account the joint school/community use of this facility.



LEGEND

- A — Existing Elementary School Buildings
- al — Additional Classroom to be built by the year 1978
- B — High School Area
- C — Vocational / Technical School Area
- bl — New Classrooms to be built by the year 1978
- D — Auditorium / Gymnasium
- E — Library
- F — Administration
- G — Hot Lunch Kitchen

TINIAN ISLAND
 PHYSICAL DEVELOPMENT MASTER PLAN
 TINIAN EDUCATIONAL CAMPUS
 master plan



LEGEND

- A — Existing Elementary School Buildings
- dl — Additional Classroom to be built by the year 1978
- B — High School Area
- C — Vocational / Technical School Area
- bl — New Classrooms to be built by the year 1978
- D — Auditorium / Gymnasium
- E — Library
- F — Administration
- G — Hot Lunch Kitchen

If and when significant numbers of school age dependents of military personnel require a new high school, a site should be located on military lands under a joint use agreement. The present school building and site could then be renovated with minimal costs to provide the necessary facilities for elementary and junior high education.

POLICE AND FIRE FACILITIES

Fire fighting equipment and the existing public safety building are inadequate and should be replaced during the plan period. The police station is located in a temporary military barracks and has inadequate detention facilities. Presently, a pick-up "fire truck" provides protection for both the village of San Jose and the airport. Capacity of the truck is 200 gallons of water and 200 lbs. of dry chemicals.

The immediate need in Tinian is for small, highly mobile fire fighting vehicles and equipment. Purchase of elaborate pumpers should be deferred until the Tinian water distribution system is upgraded and stand-pipes or fire hydrants are emplaced. Facilities to house equipment are also non-existent.

A total of \$135,000 is programmed during 1978 and 1979 for the construction of public facilities. It is suggested that the fire/police station be the first new building to be constructed as part of the Civic Center complex (See Plate 9 on page 43). Fire equipment to be purchased includes a small highly mobile "attack pumper" estimated to cost about \$25,000.

Funds to purchase this piece of equipment will come from 1977 carry-overs. The \$10,000 programmed for 1978 should be utilized for development of an overall master plan design and analysis of the condition of the existing municipal building.

PARKS AND RECREATION

The parks and recreation system for Tinian must satisfy the need for physically oriented recreational activities and passive recreational needs such as, picnicking, observance of nature and/or historic areas. The future development of recreational facilities on Tinian must also consider meeting the needs of the civilian, tourist, and potential military populations. Although the military can be expected to provide its own active recreational facilities, it should be noted that several of the better beaches and many of the historic sites are situated on properties included within Military Retention Lands. It is also important that the plan preserve areas utilized by the local populace for traditional fishing and shellfish gathering.

Several provisions of the constitution and the covenant recognize this requirement. Two specific provisions state that:

- * The constitution prohibits transfers of any interest in any public lands that lie within 150 feet of the high water mark of any beach within the commonwealth (Article XI 5/e).
- * Northern Marianas Citizens will have the same access to beach areas in the military areas on Tinian for recreational purposes (Part III, Section 3, Technical Agreement).

EXISTING FACILITIES

Active recreational facilities are limited on Tinian. Presently there is a baseball field, basketball and tennis courts at the present school site. The tennis court requires some patch work and the baseball field is in need of a new backstop. However, the facilities are useable and generally adequate.

Only Taga Beach park (Jones Beach) and Taga Quarry Beach have permanent picnic bench and barbecue pits. The above mentioned

beaches also provide the only semi-protected swimming areas. Breakwater, Tachungya, and Marine beaches, which have wooden tables, are also used for picnicking, limited swimming, and food gathering. Long Beach, Chiget Beach, and Leprosarium Beach are utilized for picnicking, shelling, fishing and wading. The latter three beaches presently lack facilities.

RECOMMENDATIONS

Plate 11 depicts the recommended plan for Tinian's parks and recreational facilities. Educational-related recreation facilities have previously been discussed in the section on Educational Facilities. Suffice it to say the use of school recreational facilities during non-school hours must be stressed as there are insufficient funds to meet all recreational requirements.

A second recreational complex should be constructed in the northeast corner of the new subdivision. Facilities to be located thereon include a basketball/tennis court, a baseball field, and eventually a youth center building. The site preparation requires the reclamation of an abandoned quarry; however, this should require little or no expenditures as it will be constructed together with the subdivision.

It is suggested that several beach parks be improved during the plan period. Three of the beach parks remain under the full control of the civilian community and include Taga Beach Park (Jones Beach) and the Tachungya/Taga Quarry Beach Park. It is recommended that additional barbecue pits and permanent tables be constructed at the latter. Landscaping of the Taga Quarry site is suggested so as to improve the aesthetic appearance of the park.

Several Beach Parks lie on Military Retention Lands, including Long, Chiyet, Invasion, Marine and Breakwater beaches. Ultimate development and utilization will be the overall responsibility of the military; however, the civilian community should be made aware of and participate in the overall planning and development of these facilities.

Two general parks or wilderness areas are also proposed. North Point General Park and the South End Park are suggested for development because of their scenic quality, semi-wilderness state, and the opportunities for hiking, nature observance and camping.

Hagoi (lake) and the Marpo Swamp nature preservation areas have previously been discussed in the section on Conservation Lands.

Beginning in 1980, \$10,000 in annual allocations to the Community Affairs Department are proposed for recreation and village facilities. A first priority should be the development of a general purpose tennis/basketball court in the new subdivision. In subsequent years, the monies should be made available for improvements to the various beaches and general parks as identified in the plan.

HOUSING PROGRAM

A recently conducted inventory of housing conditions on Tinian indicated that only thirty-seven of the existing housing units are considered adequate to meet minimum standards; the remaining 114 units are substandard. Federally assisted housing programs, available through Housing and Urban Development and the Farmers Home Administration, and local assistance as provided by the village homestead program will be available during the plan period to meet housing needs. A most critical factor affecting the success of the housing program is the development of an appropriate mix of federal versus local programs which will provide the most economical and cost efficient program. This problem has been addressed in extensive detail in the Housing Chapter of the Socioeconomic Development Plan.

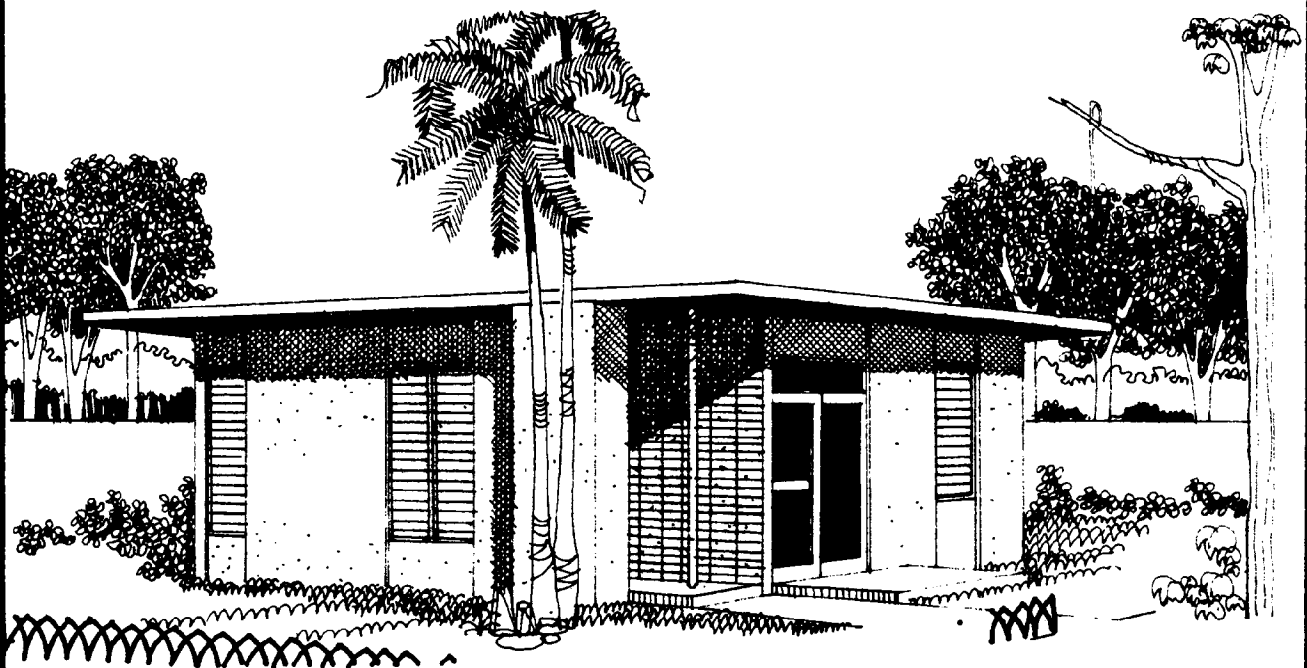
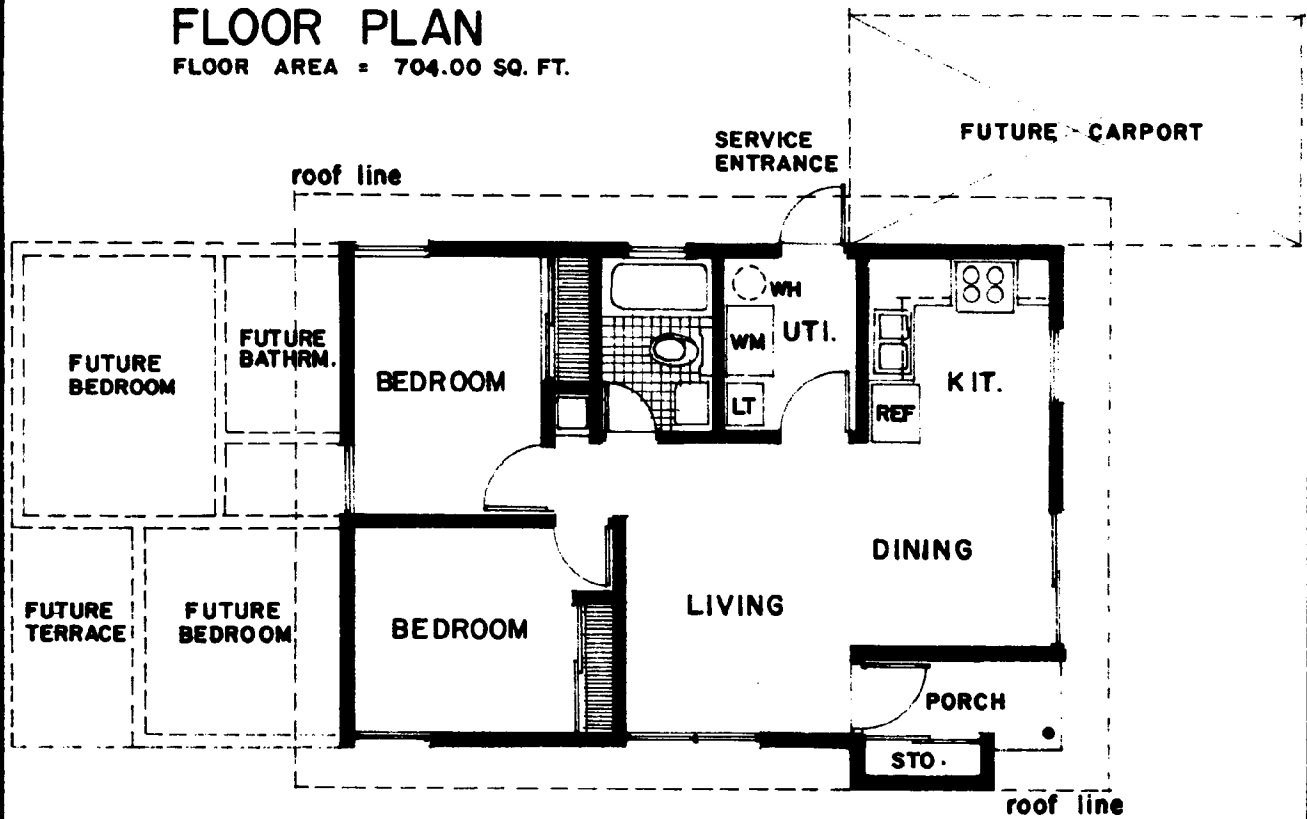
The goals and objectives of the Housing Program as identified in the Socioeconomic Plan are:

- * To provide decent, safe and sanitary houses for the people of Tinian and the Northern Marianas;
- * To develop houses under the homestead assistance program affordable to the residents of Tinian;
- * To develop house plans that incorporate conservation features, which allow for future expansion, and still meet the criteria of decent, safe, sanitary and inexpensive houses;
- * To provide amenities and infrastructure improvements to homestead housing sites without significantly increasing costs to prospective residents.

Based on the expected 1985 population, Tinian will require a total housing stock of between 193 and 237 units. Thirty-seven existing units are considered to meet minimum standards.

FLOOR PLAN

FLOOR AREA = 704.00 SQ. FT.



PERSPECTIVE
SCHEME 1

TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
HOUSING
schematic

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January 1978
Pacific Planning and Design Consultants
Saipan - Commonwealth of the Northern Mariana Islands

The number of standard or additional housing units required during the seven year plan period is projected to be between 156 and 200.

The 224 Lot subdivision presently being developed east of San Jose Village and the 20 hectare MIHA development, discussed previously in the Land Use chapter, will provide the necessary housing area to accommodate the anticipated growth during the plan period. It should also be noted that many lots within the existing village area remain vacant and can accommodate additional growth.

During the FY 1978-85 plan period, \$1.645 million will be available to the Commonwealth for site design and development; a proportionate amount should be made available for Tinian. It is essential to provide funds for Architectural and Engineering design early in the planning period in order that proper master planning for roads, water, power and other infrastructure improvements can be undertaken. Estimated costs for necessary A/E for the New Village Homestead Subdivision is \$100,000. Costs for A/E design of the MIHA parcel cannot be determined until preliminary designs are made. Design and construction of infrastructure improvements should be completed prior to the "permitting" of subdivision lots.

In order to keep construction costs as low as possible, plans have been developed for housing which provides basic minimum living space with potential for incremental expansion as family size and income increases. Plate 12 illustrates one of two schemes developed to provide this flexibility, at an approximate unit cost of \$14.5 thousand. Refer to the Saipan volume - "Public Facilities" chapter - for a more extensive treatment of this scheme.

AGRICULTURAL FACILITIES

During the seven-year plan period, allocations will be made from Capital Improvement Project funds to further develop Tinian's agricultural potential. Projects to be funded include equipment purchases, development of public beef cattle grazing lands including the construction of corrals and support facilities, expansion of the existing irrigation system and smaller, less capital intensive projects such as home canning and freezing equipment for demonstration projects (see Table 1).

During the plan period FY 1978 to FY 1985, a total of \$650,000 is proposed for agricultural improvements. Additional benefits will also be derived from CIP expenditures on Saipan for developing facilities serving the entire Northern Mariana Islands. Facilities proposed at the Kagman Agricultural Station include improvements to the Plant Pathology and Entomology facilities.

PUBLIC GRAZING LANDS

Improvements of grazing lands, corrals, and support activities for grazing lots to be built by the Government and leased to private individuals are proposed to be built during FY 1981 and 1984. Two sites are proposed for utilization for beef cattle grazing. The first site includes lands south of West Tinian Airport which will be made available as lease back property from the military. This area would have easy access to water as transmission lines have already been installed on the west side of Broadway. Such a use is consistent with the intent of the Covenant which allows for joint use of these lands, but suggests limitations or restrictions on the extent of the activity generally favoring the limitation of major capital improvements.

The second site is also on military retention lands and lies between Puntan Diablo and Lamanibot in the areas otherwise

TABLE 1

SCHEDULE OF AGRICULTURAL IMPROVEMENTS

<u>YEAR</u>	<u>SCHEDULED IMPROVEMENT</u>	<u>COST</u>
FY 1978	Resource Evaluation Study	\$ 30,000
	Purchase of Agricultural Machinery	40,000
FY 1979	Home Economics Program	15,000
FY 1980	Purchase of Agricultural Machinery	50,000
FY 1981	Development of Beef Cattle Grazing	35,000
	Expansion of Irrigation System	50,000
FY 1982	Purchase of Agricultural Machinery	50,000
	Expansion of Irrigation System	100,000
FY 1983	Expansion of Irrigation System	150,000
FY 1984	Purchase of Agricultural Machinery	50,000
	Development of Beef Cattle Grazing	30,000
FY 1985	Expansion of Irrigation System	<u>50,000</u>
	TOTAL COST OF AGRICULTURAL FACILITY	<u>\$650,000</u>

referred to as Canet and Adgidun. These lands were not proposed for lease backs in the original covenant and to secure their use would require a joint use agreement with the military.

EXPLORATORY WATER STUDY

The domestic and irrigation water supply for Tinian is obtained from Sisonyan Magpo, a fresh water marsh slightly above sea level. Estimates of the resource capability suggest that between 1.5 and 2.0 million gallons per day can be safely pumped from the marsh; however, tests to verify such yields need to be implemented before domestic and irrigation needs outpace the sustainable yield of the resource. There is also a need to implement a regular testing program to make certain that agricultural activities adjacent to the resource are not introducing contaminants to the water body. A series of bore holes, pumping tests, and water quality studies will be necessary to determine the safe yield. Expansion of agricultural irrigation facilities is dependent upon the capability of the resource to supply additional water. In 1978 some \$30,000 is proposed for resource investigation and evaluation. Recent water quality tests suggest that more frequent sampling and water quality analysis must also be undertaken.

IRRIGATION IMPROVEMENTS

Should the Sisonyan Magpo resource be capable of supplying additional irrigation waters, extension of the existing irrigation line southward and the construction of a new transmission line to serve homesteads within the northern Marpo Valley are proposed during the plan period. The Socioeconomic Development Plan has suggested that \$350,000 be allocated for irrigation improvements, with expansion to begin in 1981. The most critical factor governing expanded irrigation will be the availability of water. It is doubtful that much more than

1.5 million gallons daily would be available which, if applied at an application rate of 0.25 inches per day, would provide irrigation water for approximately 225 acres. This would allow the addition of perhaps 125 acres of irrigated cropland. Preliminary plans suggest the implementation of a main transmission line and a series of laterals be developed in a herringbone pattern in the Marpo Valley. Presently, center pivot spraying appears to be the most economical system.

The capital facilities necessary to expand the irrigation system include new pumping equipment, construction of a new force main transmission line, and the emplacement of a lateral system and center pivot spraying apparatus. Other variables include the need for a well, either renovating an existing well or constructing a new one, and should the desire be to exceed more than 225 acres of irrigated cropland, it will be necessary to develop a reservoir. Ultimate design must await the results of the resource evaluation study.

PUBLIC UTILITIES

WATER

POWER

SEWERAGE

SOLID WASTE

COMMUNICATIONS

WATER

EXISTING CONDITIONS

The people of Tinian are served by a single water resource. Sisonyan Magpo, a fresh water marsh just slightly above sea level, is located at the head of Marpo (Magpo) Valley. Two well sites 400 feet apart have been developed on the perimeter of Sisonyan Magpo, one serving potable water needs, the other serving irrigation needs.

The domestic supply system draws its water from the infiltration gallery ("Maui Well") constructed by the U.S. Military Forces in 1944. Two of the pumps have individual capacities of 180 gallons per minute (gpm). These two pumps are utilized to provide the water for San Jose Village and together can pump approximately 290 gallons per minute. The third pump, with a manufacturer's rated capacity of 325 gpm, is generally utilized to provide water to the MDC Ranch and the airport. It is possible; however, with the existing valve system to change the direction or destination of flows. Water for the village system is pumped to an 87,000 gallon tank near Marpo where the water is then transmitted to the village through an eight-inch main.

In the village, the line divides into three four-inch mains. These lines all dead-end as they are not presently looped. The construction of laterals has been haphazard with families hooking into neighbors' lines. Water pressure in many areas is said to be low, most likely a result of the haphazard lateral hook-ups and dead-end lines.

Irrigation water is presently being supplied from a dug well, the Large Marpo Well, constructed by the Japanese prior to World War II. The well is equipped with a 1000 gpm pump and serves approximately 90 acres of cropland by a 12-inch irrigation pipeline.

Residential and commercial connections to the distribution system are presently not metered, therefore, precise data on consumption is lacking. Pumpage information indicates that about ten million gallons per month are drawn by the 151 households, twelve businesses, and twelve government offices. These estimates indicate an apparent per capita consumption rate of 358 gallons per day, about three times the expected rate. Approximately one million gallons per month are utilized by the Micronesian Development Corporation ranch.

PLANNING FACTORS

Improvements to the system should provide for adequate fire protection, increased water pressure and increased storage capacity. Specific planning factors are discussed below.

Fire Protection Requirements

Presently, there are no fire hydrants on Tinian. Providing fire fighting capability for the schools, neighborhood businesses, and small commercial enterprises will require a water flow rate of 2000 gpm for a two hour duration. Residential safety will also be assured as fire fighting requirements in residential areas are at the most 1500 gpm for one hour. Thus, 240,000 gpd will provide an adequate supply of water for fire safety.

Water Pressure

It has been reported that low pressures are experienced within the distribution system in San Jose Village. This problem can be attributed primarily to the lack of adequate distribution lines forcing consumers to connect into neighbor's lines in haphazard fashion. Improvements to the distribution system such as a looped system, and the construction of a new reservoir should eliminate the low pressure problems.

Reservoir Capacity

Reservoirs should have sufficient capacity to meet the following conditions:

- * Equalize the fluctuations in the demand rate during the day.
- * Provide the highest fire flow plus maximum day consumption rate for the duration of fire flow.
- * Provide storage for maximum day consumption.

Irrigation

In order to convert available agricultural lands into productive croplands, it is desired that additional pipelines and a reservoir for irrigation water be installed. This desire can be accommodated provided that the fresh water marsh has a sustainable yield capable of meeting the demand for both domestic and agricultural needs. Sisonyan Magpo is an unusually productive source; however, it does have limits which should be established by a definitive study.

Future Domestic Demand

Table 2 summarizes the expected 1985 potable water demand. Maximum daily demand is not expected to exceed 360,000 gallons per day, with residential needs comprising 90% of the demand.

RECOMMENDATIONS

The excessive consumption of potable water indicates the need for a water conservation program. The need to develop such a program will become more apparent as future demands for water increase due to projected population growth and expansion of existing irrigation facilities. The eventual needs of the military must also be considered as the Covenant states that "water will be made available to the military at a mutually agreed upon cost."

TABLE 2
DOMESTIC WATER DEMAND 1985

<u>SECTOR</u>	<u>AVE. DAILY DEMAND (GALLONS)</u>	
Residential	198,660	
Public Facilities	15,000	
Commercial/Industrial Resort	<u>20,000</u>	
DAILY AVERAGE:	233,660	
MAXIMUM DAILY DEMAND		
(1.5 x Daily Average)	350,490	
FIRE PROTECTION	<u>240,000</u>	
TOTAL MAXIMUM DAILY DEMAND :	590,490	GALLONS

The development of sound water conservation practices requires and effective public education program. Total metering of all households, businesses, and agricultural uses is strongly encouraged. A sound program must also be based on an accurate analysis of resource availability. The study and capital facility requirements for both domestic and irrigation needs are described below. Plate 13 and 14 indicate the existing and proposed water improvements. Plate 13 illustrates the proposed main transmission lines; Plate 14 indicates the proposed improvements to the village system. Table 3 indicates the recommended scheduling for Domestic Water Improvements.

Aquifer Study

The study will assess the capability of Sisonyan Magpo to provide additional irrigation waters. It is crucial that the study be completed prior to expanding the irrigation system. The study has been scheduled for FY 1978 and budgeted with \$30,000 from CIP funds for agricultural development.

Reservoir Tank

Presently, an 87,000 gallon tank constructed during Japanese occupation serves as the supply reservoir for San Jose Village. A one million gallon tank is needed to provide fire fighting and emergency supplies. About five days of maximum daily demand will be assured with the million gallon reservoir at the present population level. With population projected to be 1800 by 1985, a million gallon tank will be capable of providing a minimum of two days supply at maximum daily demand in addition to meeting fire fighting demand. The estimated cost for the tank including engineering and design is \$400,000. Final location and design of the tank should consider the possibility of providing water to the West Tinian airfield.

TABLE 3

SCHEDULE OF DOMESTIC WATER IMPROVEMENTS

<u>YEAR</u>	<u>SCHEDULE IMPROVEMENT</u>	<u>COST</u>
FY 1978	Design of Distribution System*	\$ 76,000*
FY 1980	Reservoir Tank	300,000
FY 1981	Reservoir Tank	100,000
	Design of Transmission Lines	24,000
	Transmission Line (from tank to village)	87,000
	Replacement of old village lines	89,000
FY 1982	Replacement of old village lines	41,000
	New Housing Distribution lines	159,000
FY 1983	New Housing Distribution	17,000
	Transmission Line from Well to Tank	153,000
	Appurtenances	<u>30,000</u>
TOTAL DOMESTIC WATER IMPROVEMENTS :		<u><u>\$1,076,000</u></u>

* Must await resource capacity study. The design would perhaps be appropriately budgeted for FY 1978.

TINIAN ISLAND PHYSICAL DEVELOPMENT MASTER PLAN

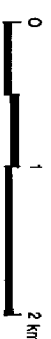
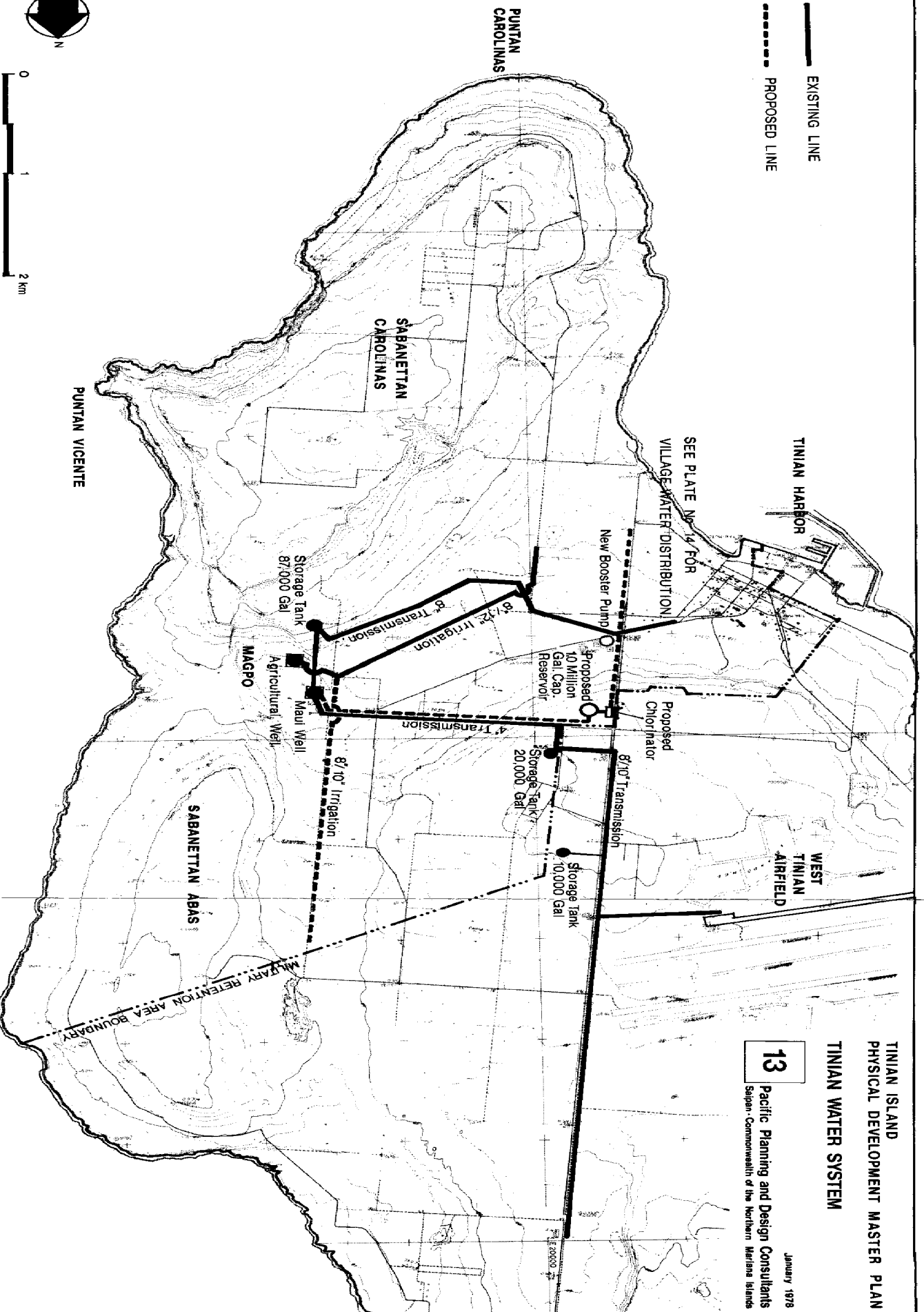
TINIAN WATER SYSTEM

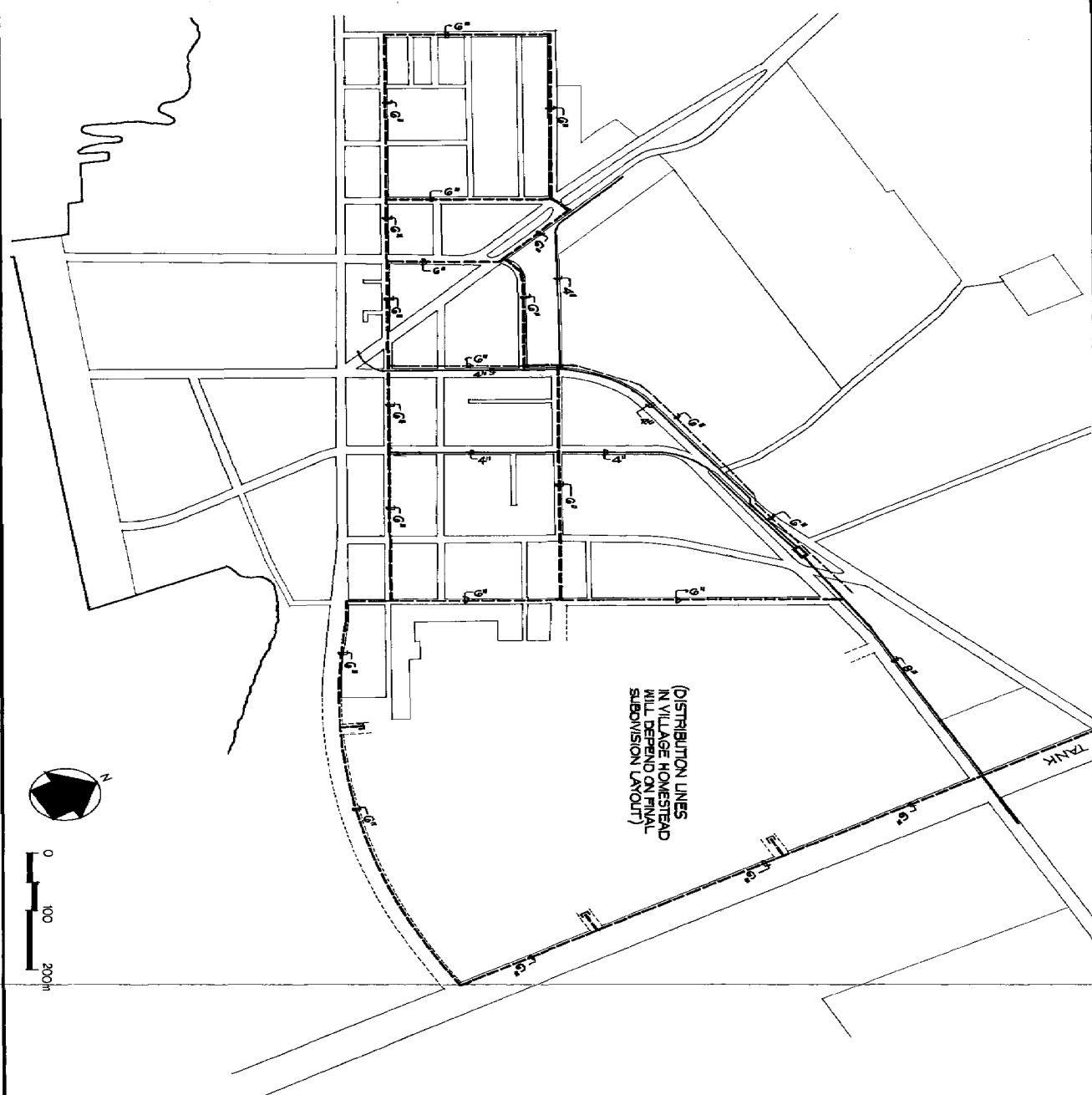
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Saipan, Commonwealth of the Northern Mariana Islands

January 1978

— EXISTING LINE
- - - PROPOSED LINE





LEGEND

- 6" LINE TO REPLACE EXISTING 4" WATER LINE
- EXISTING MAIN TRANSMISSION LINE FROM WELLS
- EXISTING 4" WATER LINE
- PROPOSED NEW 6" DISTRIBUTION LINES
- - - 6" STUB-OUT FOR FUTURE CONNECTION

TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
SAN JOSE VILLAGE
water distribution system

Distribution Line Loops

The existing four-inch lines in the village all dead-end, making proper hook-ups to the system impossible. Replacement of the four-inch lines with six-inch lines and looping of the system will enable the installation of laterals for residential connections and provide fire protection capability. Looped distribution lines result in greater system reliability. Costs of the upgrading will be approximately \$130,000.

Broadway Transmission Line

From the million gallon tank, a six-inch line should be installed along Broadway to service the new village homestead area and the proposed MIHA housing area. Approximately 5,400 feet of six-inch pipeline will be necessary at an estimated construction cost of \$87,000.

Eight-inch Transmission Line

A new eight-inch line is proposed to feed the reservoir tank from the existing well. The line should run parallel to the MDC potable line as this route will require minimum pumping effort. Moreover, the existing eight-inch line which transports water from the 87,000 gallon tank to the village requires improvements that are being completed on a section by section basis. If studies indicate feasibility, the million gallon tank will initially be fed off the MDC potable water line. A new pump may be required, but final determination should be made when detailed engineering studies are made. Cost for construction of the new line are approximately \$153,000.

New Housing Distribution Lines

The New Village Homestead area will require approximately 11,000 feet of six-inch lines. These six-inch lines will enable the installation of hydrants to provide fire protection. Costs will be in the order of \$176,000. It is proposed that the remaining four-inch lines within San Jose Village be replaced with six-

inch lines which are more suitable for fire hydrant connections. The replacements of these lines will not be accomplished within the immediate planning horizon, unless additional monies become available.

Appurtenances

The existing chlorinator and chlorination procedure are inadequate. A replacement chlorinator located at the reservoir tank will allow for more detention time and higher quality water.

Water meters are to be provided for all consumers. Present estimates of consumption indicate that about three times the expected amount is being consumed. Metering at the point of consumption is a deterrent to waste that will hopefully result in a reduction of water consumption. The reduction in domestic consumption should make additional water available for irrigation purposes.

Fire hydrants and valves are also proposed to be installed within San Jose Village on the new six-inch lines. The hydrants should be spaced such that a 200 foot radius is served by each hydrant.

Total costs of the chlorinator, metering, and fire hydrants, will be approximately \$50,000.

Should study indicate that Sisonyan Magpo is capable of supplying additional irrigation water, it is suggested that an irrigation line be constructed northward up the Marpo (Magpo) valley. Plate 11 on page indicates the location of existing and proposed irrigation facilities. Only the main transmission line is illustrated. The ultimate system would be in a herringbone pattern, that is, laterals would be constructed perpendicular to the main line along homestead boundaries. Table 4 indicates the proposed schedule of agricultural irrigation improvements.

TABLE 4

SCHEDULE OF AGRICULTURAL WATER IMPROVEMENTS

<u>YEAR</u>	<u>SCHEDULED IMPROVEMENT</u>	<u>COSTS</u>
FY 1978	Resource Study	\$ 30,000
FY 1981	Irrigation Line Expansion and Improvements	50,000
FY 1982	Irrigation Line Expansion and Improvements	100,000
FY 1983	Irrigation Line Expansion and Improvements	150,000
FY 1985	Irrigation Line Expansion and Improvements	<u>50,000</u>
	TOTAL AGRICULTURAL WATER IMPROVEMENTS :	<u><u>\$380,000</u></u>

POWER

EXISTING CONDITIONS

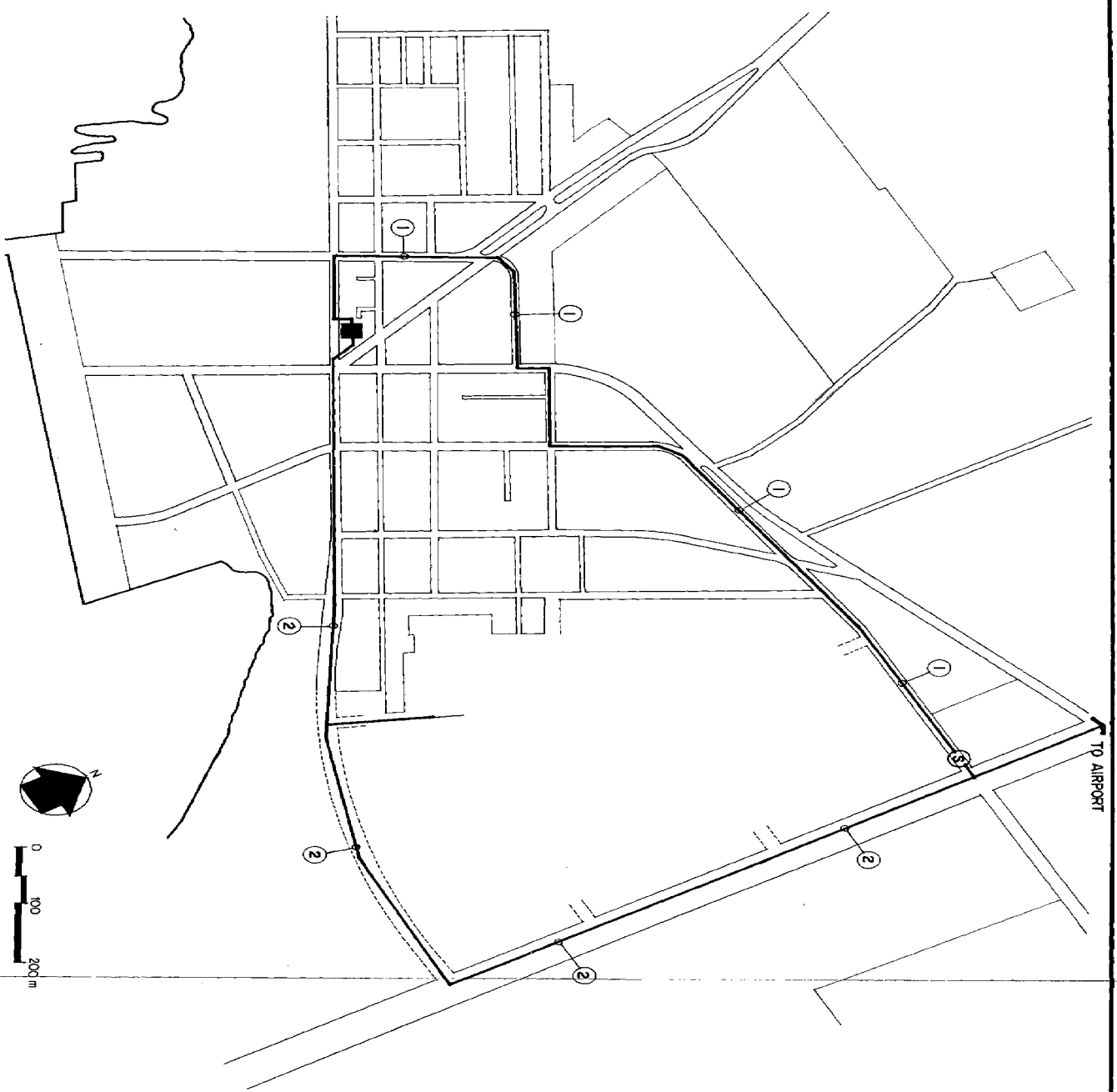
The present power plant consists of two 300KW White Superior generators. The system's firm capacity, defined as the capacity when the largest unit is inoperative, is 300KW.

The existing distribution system consists of one three-phase 4160 volt circuit of No.6 AWG copper conductors with a capacity of 720 KVA. The major area served includes the village of San Jose with one spur line extending up Broadway to the MDC slaughter house. A second spur line extends into the Marpo valley providing power for the Sisonyan Magpo water wells, the agricultural station, and several homesteads within the valley.

The present peak demand is 345 KW which is greater than the system's firm capacity. Thus daily operating of both generators is required which has hampered efforts to conduct scheduled maintenance and overhauls.

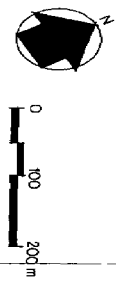
PLANNING FACTORS

In recognition of the need for increased power generation capacity on Tinian, a new 600KW generator is programmed to be purchased in 1978. Although present plans are to install the new generator in the existing power plant, long range considerations suggest that the plant should be relocated outside of the village area. The land use plan and the illustration depicting the physical facilities (Plate 8 on page 41) identify a possible site for future relocation of the power plant. However, this site is located on Military Retention Lands. Therefore, a joint use agreement would have to be negotiated with the military.



LEGEND

- 1 CIRCUIT NO. 1 720KVA
- 2 CIRCUIT NO. 2 720KVA
- 3 SWITCH
- POWER PLANT



**TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
SAN JOSE VILLAGE
power distribution system**

The Technical Agreement, in Section 4 of Part III (See Appendix I), allows for the Military to make excess utility capacity available to the civilian community. In the same section, it also states that additional capacity may also be added to facilities being constructed for military purposes if the civilian community desires to purchase power from Military plants. Such additions are subject to full payment by the community of the incremental cost for the additional capacity.

Thus an alternative to relocation of the existing plant is the purchase of power from the military. Should a major power plant be constructed in conjunction with a military base on Tinian, the existing power facility in the village could then be used as a stand-by plant.

RECOMMENDATIONS

With the proposed addition of a 600KW generator to the existing power plant in 1978, enough lead time should be available to carefully evaluate possible future options. It will not be necessary to design and/or construct a new power plant until the load exceeds 600KW.

The relatively low system loads that are felt at this time imply that projections for the future will be sensitive to major changes. Any sizeable commercial or industrial development will have a large impact upon the system. Future development activity should be monitored yearly to determine new demands upon the existing system.

Distribution System

The proposed distribution system (depicted on Plate 15) will consist of two 720KV capacity circuits. One circuit is proposed to serve the north and west sections of the village and then extend north to the Airport and MDC. The second circuit is proposed to serve the eastern section of the village including the harbor and the agricultural homestead lands, and the proposed MIHA project. Both circuits will provide service to the administrative complex and the Dispensary.

SEWERAGE

The primary means for wastewater disposal on Tinian are outdoor privies, cesspools, and septic tanks. Presently, there are less than 10 homes with flush toilets connected to cesspools, and a total of 16 toilets in various municipal buildings, including the school, which are connected to one major septic tank. Of the 150 homes on Tinian, approximate 20% have experienced problems or failures with privies and cesspools.

PLANNING FACTORS

The civilian population of Tinian is projected to increase from its present day 900 people to a maximum of 1800 by 1985. Although approximately 56 acres of land are reserved for light industrial uses, a realistic estimate of development indicates that perhaps 25% of this land area would be developed in the plan period. Limited development in commercial and resort zones are also anticipated for the seven year, 1978-1985 plan period.

Sewage Flows

Table 5 presents estimates of daily sewage flows projected to occur by the close of the plan period. Average daily waste flows anticipated for the village of San Jose and adjacent areas is estimated at 178,200 gallons per day. These estimates are based on optimistic development projections. However, the standard of living in Tinian must be significantly upgraded for actual flow to approach estimated values. For this to happen, the water distribution system must be improved and adequate plumbing and flush toilets installed in every residence.

Treatment and Disposal Alternatives

The question of the degree of treatment and manner of ultimate sewage disposal from San Jose village must be comparatively

TABLE 5

AVERAGE DAILY SEWAGE FLOWS, 1985

<u>SECTOR</u>	<u>NO. OF UNITS</u>	<u>FLOW GENERATION PER UNIT</u>	<u>AVERAGE FLOWS (GALLON)</u>
Residential	1800 Persons	80	144,000
Education w/Cafeteria	600 Students	20	21,000
Medical	12 Beds	250	3,000
Commercial/ Industrial	14 Acres	Estimated	15,000
Resort/Hotel	70 Rooms	60	<u>4,200</u>

TOTAL AVERAGE DAILY FLOW: 178,200 GALLONS

1. Generation rate of 80 gallons per day per person, including allowance for groundwater infiltration.
2. Includes an allowance for cafeterias, but not gymnasiums with showers.

analyzed with respect to construction cost, operation and maintenance costs, and overall environmental impact. The sewer facilities planning effort should include a detailed evaluation of treatment and disposal alternatives. Those systems presently under study include:

- * Continuation of existing septic tanks and cesspool systems.
- * A collection system within the village and on shore lagoon treatment.
- * Collection system, and ocean outfall with or without treatment.

Analysis and selection among system alternatives should provide for the character and scale of development anticipated for Tinian, and should avoid overdesign based on the application of inappropriate criteria. Previous Trust Territory experience with federal and EPA criteria has occasionally indicated blind application of planning, design, and construction standards. Sophisticated primary and secondary treatment facilities costing millions of dollars are ineffective when turned over to ill-equipped, untrained local government personnel for operation and maintenance.

Furthermore, because of the typically low standard of living in the islands, treatment plants often become inherently inoperable because of insufficient minimum sewage flows. This situation could easily occur in Tinian where the developing economy is fragile, logistics difficult, and power costs high. Treatment and disposal facilities for Tinian must be thoroughly justified and be constructed so as to require minimum maintenance.

RECOMMENDATIONS

The construction of a collection system, a treatment plant, and an ocean outfall require extensive capital investments. It is emphasized again that the need for such a sophisticated

system must be carefully analyzed for cost effectiveness. The analyses must also consider the operating and maintenance requirements for sophisticated treatment alternatives.

The NMI Department of Public Works is currently preparing a facilities plan for the Northern Mariana Islands. This plan will ultimately determine the need for, and proposed phasing of, a public sewage collection and disposal system for Tinian.

In the interim, it is recommended that:

- * Single family residences with adequate plumbing and toilet facilities continue to be served by cesspools and septic tanks wherever the coralline rock formations will allow percolation.
- * Multiple dwelling units be served with septic tanks and leaching fields.
- * "Group" cesspools or septic tanks be utilized for adjacent lots lacking adequate areas for individual disposal units or when underlying soil conditions make the utilization of individual systems impractical.

Most of Tinian is underlain by coralline rock formations, which exhibit a wide range of permeability. The use of septic tanks and leaching fields, as well as cesspools, is feasible and recommended for Tinian during the plan period. However, design of individual sewage disposal units must be based upon an accurate projection of sewage flows and upon the results of field percolation tests for each specific site. These two factors, rate of percolation and sewage loading, will determine the size and configuration of each disposal unit. The septic tank/leaching field failures occasionally being experienced in Tinian are likely due to inadequate designs. The Manual of Septic Tank Practice published by the U. S. Department of Health, Education and Welfare provides an excellent guide for design and construction of individual sewage disposal units and is recommended for use in the Northern Marianas.

SOLID WASTE

EXISTING CONDITIONS

The present method of solid waste disposal on Tinian is through open dumping at a site approximately one and one-half miles northwest of the village of San Jose. Up until approximately two years ago, wastes were dumped directly into the ocean. The site presently being utilized for disposal is an abandoned quarry situated within Military Retention Lands. With the exception of government facilities, there is no collection system and civilians are responsible for handling and disposing of generated waste.

The dump site lends itself to development into a suitable sanitary landfill. The site is far removed from the island's potable water supply and should pose no problems with respect to leachate polluting the groundwater resources. Presently, because of open dumping and failure to properly cover and compact the waste, the dumpsite has become a breeding place for rodents.

PLANNING FACTORS

Although no information was available on the amount of household refuse produced on Tinian, the amounts of refuse should be no greater than that produced on Guam - 3.9 pounds per capita daily. These weights relate to a per capita yearly rate of 1422 lbs. These quantities are conservative in that people of Tinian probably generate less refuse than people of Guam because more food and garden waste is recycled as animal feed. In any event, the present landfill site is adequate for the present planning horizon.

Assuming a compacted volume of 1000 lbs per cubic yard, 1.4 cubic yards per year on a per capita basis will be generated on Tinian. The present population of 900 persons would, therefore, produce 1,281,000 lbs per year. This would require a spatial volume of approximately 1,281 cubic yards to dispose the refuse to be generated in 1978.

Population projections for Tinian indicate a range between 1300 and 1806, by 1990. In the thirteen years between 1978 and 1990, approximately 24,160,943 lbs of solid waste will have accumulated and require disposal. (See Table 6).

Assuming compacted refuse equals approximately 100 lbs/cu. yd., Tinian will need a sanitary landfill area capable of handling 24,160 cubic yards of material.

RECOMMENDATIONS

A small population with a relatively small magnitude of solid waste suggest that adequate yet cost effective practices must be developed. Waste collection by private enterprise would reduce costs for the Government; however, it is doubtful that such a system could be implemented unless it was made mandatory by municipal ordinance. The feasibility of purchasing specialized equipment such as packer trucks or a land fill bulldozer that would be greatly underutilized must be questioned. Still it must be recognized that present conditions result in indiscriminate disposal of solid waste at numerous sites. Often refuse is discarded along the road to the site or is blown off the back of pick-up trucks on the way to the dump site. The following recommendations should improve the present conditions.

- * Initially a joint use or leaseback agreement be secured from the military so that the existing site be continued as the sanitary landfill for the island.

TABLE 6

TINIAN SOLID WASTE GENERATION
1978 - 1989

<u>YEAR</u>	<u>POPULATION</u>	<u>REFUSE IN THOUSANDS OF POUNDS (000's)</u>	<u>REFUSE IN CUBIC YARDS</u>
1978	900	1,281	1,281
1979	981	1,373	1,373
1980	1063	1,488	1,488
1981	1145	1,603	1,603
1982	1227	1,718	1,718
1983	1309	1,833	1,833
1984	1391	1,947	1,947
1985	1472	2,061	2,061
1986	1554	2,176	2,176
1987	1635	2,289	2,289
1988	1717	2,404	2,404
1989	1800	<u>2,562</u>	<u>2,562</u>
COMULATIVE TOTALS 1978 - 1989		<u>22,735</u>	<u>22,735</u>

- * The Department of Agriculture or the Public Works bulldozer should be commissioned weekly to properly prepare, cover, and pack the refuse at the landfill site.
- * Implementation of once a week collection utilizing Public Works crews and a dump truck should be considered. Given the limited number of collection points (less than 200) it is assumed that the entire village could be collected in an 8-hour day.

Due to the relatively small amount of waste generated, the most efficient disposal method appears to be a sanitary landfill. Resource recovery systems have not yet been developed which are economically efficient to handle the volume of waste generated on Tinian.

The Capital Improvement Program provides \$70,000 in 1983 for further development of the sanitary landfill and the purchase of equipment. Present sanitation practices suggest that a collection system be implemented immediately utilizing existing equipment and manpower. A suitable alternate method which might be implemented in the future would be the establishment of collection sites within the village which would be periodically emptied by Public Works.

COMMUNICATIONS

EXISTING CONDITIONS

Telephone, inter-island radio, and mail service form the basic communications system for the Northern Mariana Islands. At this time, telephone service is restricted to Saipan. In Tinian, inter-island communications are furnished by short-wave and general broadcasting radio systems supplementing U. S. Mail delivery.

Telephone Service

The telephone system which was operated by GNMI through the end of FY 1976, has been leased to Micronesian Telecommunications Corporation (MTC) for a 10-year period. Options to renew the lease for two five-year periods may be exercised by the private firm.

Commercial and private overseas telephone (and cable) service had been provided by RCA Global Communications which leased 5 circuits from the Trust Territory Government's communication link with Guam. The lease was terminated in early 1977, and all franchise for telecommunication "to, from, and within the Northern Mariana Islands" are now provided by MTC.

Radio Service

The GNMI operates a system of single side band voice radios to provide quick and direct contact between the Office of the Resident Commissioner and his representatives on Tinian and Rota. Additional small HF transceiver radios are stationed on each of the inhabited northern islands. In all cases, island-to-island contact and clarity of reception is dependent upon skip and propagation conditions so that radio communication is not infrequently disrupted.

The system is reserved for official governmental communications. Private individuals or businesses must rely upon letter or word-of-mouth communication between and among the islands of Saipan, Tinian, and Rota.

Popular radio broadcasting stations also provide a means for inter-island communications primarily disseminating news, programs of local interest, music, and other entertainment. A government-operated radio station, KJOR, and a privately-owned station, WSZE, broadcast from Saipan and their signals can be received on Tinian.

Mail Service

Mail service in the Northern Marianas is provided by the U. S. Postal Service. A main post office is located in Chalan Kanoa, with substations on Capitol Hill at the Trust Territory Headquarters, and Tinian.

FUTURE EXPANSION

Expansion of telecommunications in the Northern Marianas will focus on telephone services. On-island telephone service as well as inter-island telephone contact are planned for Tinian. As originally proposed by MTC, a fully automatic ECON PABX system will be provided to accommodate 25 subscribers including two pay phones for public use.

Telephone operator consoles will not be installed until the need arises. The Saipan operators will be utilized in the interim for calls to Saipan. Access to the Guam GTA and RCA Global will also be provided by the Saipan operators for calls to Guam and Rota and for overseas calls.

The two pay phones are to be located at the airport and in Cruz Store in San Jose Village. Each pay phone will provide

the caller with the same service as residential subscribers. Calls to Guam, Rota, and overseas will be handled by a credit card system.

Plans for expansion were originally outlined as part of the MTC proposal submitted during competition for the telecommunications franchise in the Northern Marianas. Original plans had proposed to have telephone service for Tinian during 1977. However, the timetable for system implementation is being revised and service is not anticipated to be operational until August 1978.

TRANSPORTATION

AIR

WATER

HIGHWAYS

AIR TRANSPORTATION

Air transportation is the principal mode of travel to and from the island of Tinian. Island residents are highly dependent upon air transportation for perishable foods, medical supplies, many durable goods, and personal travel. This places a priority on safe and reliable air transportation and efficient airport facilities.

EXISTING CONDITIONS

The institutional structure for air transport development in the Northern Marianas is already established. The Mariana Islands Airport Authority (MIAA), created by the Congress of Micronesia in April 1975, is the public corporation responsible for the development and operation of airports in the Northern Marianas. MIAA is self supporting, deriving revenues from enplaned passenger fees, aircraft landing fees, and rental of airport properties. In addition, it has the capacity to issue revenue bonds for construction or airport repair. The Authority is an independent agency, functioning completely outside the budget and administrative structure of the Government of the Northern Mariana Islands.

Under the aegis of the Trust Territory Department of Transportation, an Airport System Plan has been formulated by a private consultant for the entire Trust Territory including the Northern Marianas. This plan presents forecasts of air traffic, followed by recommendations concerning airport development for Tinian and its neighboring islands of Saipan and Rota, complete with phasing and estimated costs. The Mariana Islands Airport Authority is shaping its airport development program to a large extent according to the consultants' plan.

A few specific issues related to airport development and use are relevant. The West Tinian Airport is located within the lands made available to the United States under Section 802 of the "Covenant to Establish a Commonwealth of the northern Mariana Islands." Under the terms of the Technical Agreement, provisions are made for continued civilian and Northern Mariana Islands use of airport facilities at the present site or a nearby relocated site if required by future military activities.

The Technical Agreement states: "The use of facilities presently in existence at the West Field location and the use of the present air strip will continue on an uninterrupted basis prior to, during and subsequent to initial construction upgrade and during any future improvement program to the maximum extent possible."

If relocation of the civilian airport is necessary, the United States will reimburse the NMI for the existing facility (fair value) and make alternate land available at nominal cost as near as practicable. The costs of relocating terminal facilities and the necessary replacement of parking areas and aprons will be borne by the United States Government.

Ideally, the cooperative arrangements between the U. S. Government and the NMI Government should preclude any major problems arising from the above issues.

PLANNING FACTORS

The U.S. Military constructed two (2) airfields on Tinian during the Second World War. The northfield has four (4) 8,500 foot airstrips designed and constructed to accommodate B-29 aircrafts. Included with the four (4) airstrips were taxi-ways and service areas. This airfield was abandoned after the Second World War and has never been re-activated.

The second airfield, situated in the west central part of the island has two (2) 8,500 foot airstrips and a shorter 6,000 foot airstrip. The existing airport utilizes the 6,000 foot airstrip. The runway is approximately 150 feet wide and is in good condition. However, the airfield is generally deficient in runway approach and transitional clearances.

Tinian is served by only one scheduled commercial carrier, Continental-Air Micronesia, which stops on Tinian twice a week. Continental-Air Micronesia has indicated that its prime interest on Tinian is cargo service, with passenger service being secondary. Furthermore, Air Micronesia has indicated that it does not plan to initiate night flights to either Rota or Tinian in the foreseeable future. Air passenger service is largely accomplished by small air taxi operators such as Island Air, Aviation Service, Tinian Air, and Foxair. Special Charter and sightseeing flights are also available. These air-taxi operations utilize small single or twin engine aircraft. Because of relatively frequent and regular air-taxi service, this type of transportation will remain a significant factor in the movement of air passengers between Saipan and Tinian.

With the wide range of aircraft available to the air-taxi industry, and the unique transportation requirements of the Tinian to Saipan hop, the air-taxi industry will become stronger and larger, and be an important user of airport facilities.

Air Traffic Forecasts

The air traffic forecasts used in this report are those developed in the Trust Territory Airport System Plan report. Projections of air passenger traffic and cargo/mail volumes were used to derive aircraft operations needed to handle

these forecasts. Aircraft operations are broken down into air carrier-passenger, air carrier-all cargo, air taxi, general aviation, and military operations. Peak hour forecasts are also included. The forecasting methodology considers historical visitor arrival statistics, the economic profile, and the political aspects of the whole of Micronesia. Table 7 summarizes the forecasts for Tinian airport.

PROPOSED AIRPORT IMPROVEMENTS

The immediate objective of the Mariana Islands Airport Authority is to attain and retain air carrier certification for its existing air carrier airports in accordance with the FAA safety and operational standards, Federal Aviation Regulations, Part 139. This is planned to be accomplished by January 1978, when the Northern Mariana Islands becomes a Commonwealth Government.

This section identifies current and projected airport developments for Tinian necessary to meet safety and security requirements, as well as to provide minimum facilities for passengers. The study has not included the impacts of the proposed combined military air and sea installation on Tinian. At such time as the military plans are made firm and formal agreements have been reached, the physical plan for West Tinian Airport will have to be reviewed and possibly revised to accommodate particulars of the negotiations. The following improvements for Tinian are proposed.

- * Several basic improvements are immediate. These include: Clear and grub runway safety areas, approach, and transitional surfaces for obstructional surfaces; install wind cone/segmented circle and runway markings; and clear and grub terminal area. These requirements will be met with ADAP Project No. 6-75-0011-01, funded in fiscal year 1977.

TABLE 7

SUMMARY OF AIR TRAFFIC FORECASTSWEST TINIAN AIRPORT

1980-1995

<u>Year</u>	<u>Air Passenger Movements (ENP & DEP)</u>	<u>Total Arriving Cargo/Mail Volume (000 pounds)</u>	<u>Air Carrier Passenger Aircraft</u>	<u>Air Carrier All Cargo Aircraft</u>	<u>Air Taxi</u>	<u>General Aviation</u>	<u>Military</u>	<u>Total</u>
1980	4,474	1,262	384	208	3,160	100	52	3,904
1985	7,606	2,085	538	208	5,060	200	52	6,058
1995	13,750	4,617	898	520	8,100	400	52	9,970
<u>Peak Hour Operations:</u>								
1980			2		3	1	-	6
1985			2		4	1	-	7
1995			2		6	1	-	9

- * Construct connecting taxiway and apron; grade to provide clear runway safety areas and transitional surfaces; construct airport access road and crash/fire rescue building, including fire truck; and install perimeter safety and personnel security fence. These improvements are proposed to be funded in fiscal year 1978.
- * Construct new terminal building and vehicle parking lot. The MIAA is pursuing funding of these requirements through the Economic Development Administration Regular Program.
- * Install runway and taxiway lighting, including navigational aids.

With the completion of these minimum improvements, it is anticipated that Tinian will be able to accommodate aircraft useage much larger than projected without significant facility addition.

Capital Cost

Estimated costs during the plan period for the Tinian airport are approximately 2.2 million dollars. Table 8 indicates the anticipated scheduling of project. Funding of the project is anticipated from FAA automatic and discretionary funds with local matching funds provided from MIAA revenues. Other revenue sources may include EDA Regular Program funds.

TABLE 8
AIRPORT DEVELOPMENT COSTS
WEST TINIAN AIRPORT
Cost and Source (\$000)

<u>FISCAL YEAR</u>	<u>ACTUAL PROJECTS</u>	<u>FAA</u>	<u>MIAA</u>	<u>OTHERS⁴</u>	<u>TOTAL</u>
1977	Clear and grub, runway markings, wind cone, segmented circle ¹	198.4	22.0	-	220.4
1978	Taxiway and apron, grading, access road, CFR building, fire truck, fencing ²	1,440.0	160.0	-	1,600.0
1978	Terminal Building, auto park- ing lot ³	-	-	344.0	2,164.4
	Sub Totals	1,638.4	182.0	344.0	2,164.4
	<u>Potential Projects</u>				
1984 & Beyond	Runway and taxiway lighting, nav aids	936.0	234.0	-	1,170.0
	Sub Totals	936.0	234.0	-	1,170.0
	Totals	2,574.4	416.0	344.0	3,334.4

1. Project which had been recently bid; figures indicate grant amounts
2. Project currently under design; figures indicate application amounts
3. Project currently under design
4. Potential source of fund assumed to be EDA

WATER TRANSPORTATION

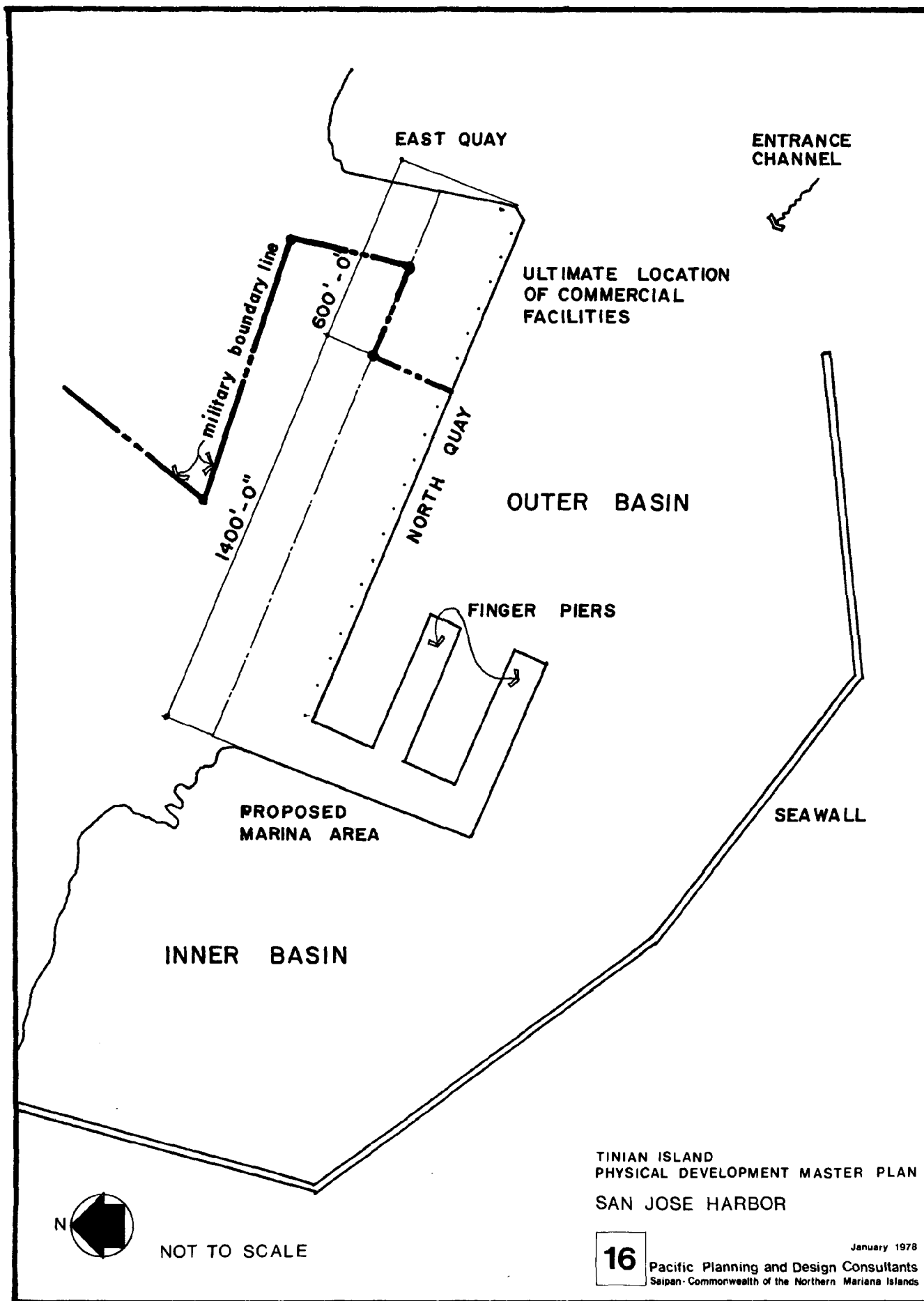
EXISTING CONDITIONS

San Jose Harbor is located on the south-southwest shore of Tinian and was built by the military as the major staging area for U. S. Forces in the Marianas. The south and west limits of the harbor are delineated by a 1-1/4 mile long seawall enclosing roughly 100 acres of harbor. Docking facilities line the northern shore (See Plate 16).

The harbor is formed into two basins approximately equal in size and separated by an F-shaped system of finger piers. The inner basin is used by smaller craft, i. e., ferries, workboats and pleasure craft. The outer harbor is the primary harbor in which all heavy commercial operations take place. Once-a-week barges unload supplies at the west end of the north quay. A fuel off-loading facility is located just east of the barge facility.

The paved areas on the piers and quays are in use as cargo storage and distribution areas as well as providing vehicular traffic with access for the movement of cargo. The depth of water at the pier and quay pilings is about 24 feet and increases towards the basin center. The seawall structure is built on a shoal or reef in about three (3) feet of water.

The present facility is over 30 years old with sheet pilings now generally in very poor condition. Much of the seawall along the west limits and at the tip have been almost completely removed by previous storms and normal deterioration. Prior to typhoon Pamela in May of 1976, about 900 feet of the North Quay and all of the finger piers were actively used. Minimal maintenance work had been performed on the facilities since abandonment by military forces shortly after World War II.



Typhoon Pamela

Storm waves breaking on the sheet pile structures caused an accelerated loss of backfill and, consequently, the pavement and concrete cap along the north and east quays collapsed. Estimated cost to replace Tinian Harbor to pre-typhoon conditions is greater than \$700,000. Much of the cost for repair is eligible for compensation under the Federal Disaster Assistance Act (FDAA).

PLANNING FACTORS

Present port utilization is quite low with cargo movements estimated to be less than several thousand tons per year. A once-a-week barge service as well as occasional TT vessels call at Tinian port. Table 9 includes a list of the TT and private vessels that either presently or may in the near future utilize Tinian harbor. Since individual shipments to and from Tinian are only a few hundred tons, it is assumed that smaller vessels or barges would continue to be the principal mode for moving cargo to and from Tinian in the near future. This would also include transshipments from either Guam or Saipan.

Presently, the need for small boat facilities is minimal. There are less than 10 trailerable boats on the island and only the Tinian II (the Fishing Coop boat) and two other private vessels, require permanent wet berthing areas. Joint development of a small boat recreational marina in the inner harbor should be pursued in conjunction with the military.

RECOMMENDATIONS

San Jose Harbor will initially be under the control of the Government of the Northern Mariana Islands as provided for by the Technical Agreement. If a decision is made by the

TABLE 9
VESSELS EXPECTED TO CALL AT TINIAN PORT*

<u>Name of Vessel</u>	<u>Length</u> (feet)	<u>Breadth</u> (feet)	<u>Depth</u> (feet)	<u>Draft</u> (feet)
Marshall Islands	185.00	33	11	**
Kaselehlia	131.23	28	11	10.10
Truk Islander	111.02	22.31	9.84	8.88
Yap Islander	111.02	22.31	9.84	8.88
Tinian II	40.00	12.00	6.00	**
Olwal	72.41	15.60	7.60	**
Normar II	122.00	23.00	10.40	9.20
New Field Trip Vessels	185.00	33.00	15.00	11.00
Mapship/Dillingham Barge	175.00	45	-	4
Tugboat (Barge Escort)	75.00	25	-	13

* Data revised in accordance with the American Bureau of Shipping Record Book, 1977.

** Information not published.

Department of Defense to implement plans for an operational joint service base, appropriate joint control arrangements will be made. When the United States upgrades the existing harbor, the Government of the Northern Mariana Islands will upgrade its approximately 600 feet of wharf space or reimburse the United States for having such services performed. Estimated cost to upgrade the existing dock is approximately \$2,000 per lineal foot or \$1,200,000 for the entire section.

Should a major military base be constructed on Tinian, it will be important to establish regular ferry service between Tinian and Saipan in order to promote a steady flow of goods and labor necessary to support both the base construction, and later the base operations. Organization of this service can be more fully considered when plans and timing for the Tinian base development appear firm.

With the proposed repair and minimal improvements to be funded by FDAA, the existing facilities will be more than adequate to handle the number and size of vessels anticipated to utilize the harbor. Repairs will upgrade at least 1000 feet of berthing area which will accommodate any commercial traffic envisioned during the short range plan.

Long range plans must include the relocation of the Northern Mariana facilities to the eastern 600 feet of North Quay. The inner basin should continue to be utilized as a small boat basin/marina. Estimated costs for reconstruction and relocation to the eastern portion of the pier are \$1,200,000. To prepare for this expenditure, CIP resources have been budgeted for FY's 1983 thru 1985.

HIGHWAYS

EXISTING CONDITIONS

The main roads on Tinian were constructed during or shortly after the war. With the exception of certain alignment and intersection problems, primarily located in the village, these main roads appear to be quite adequate to serve the access requirements of various areas.

The surfaces of the main roads also appear to be in excellent condition despite only minimal maintenance. A program of asphalt over-lays, improvements to the shoulders and drainage facilities, and regular maintenance should prolong the useful lives of the roads by five to ten years.

Village roads on Tinian especially those roads in an east-west direction require improvements as they are generally of unimproved coral.

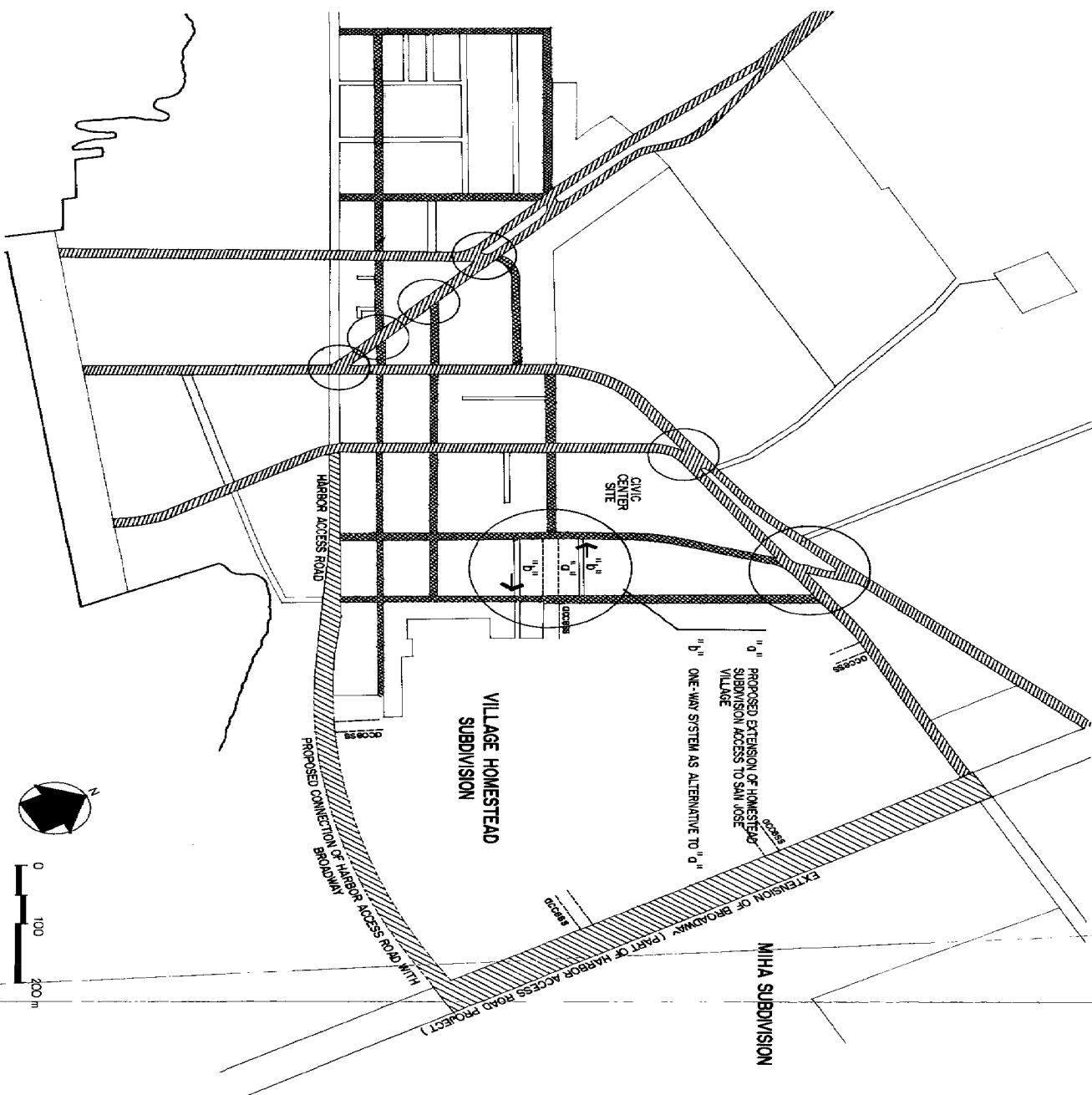
In 1977, the number of vehicles registered on Tinian totaled 155. During the next seven-year period, the number of vehicles is expected to double owing to increases in capital facility investments and economic activities.

It should be emphasized that an influx of military personnel and increases in military activities would have significant impacts on the island's road system. A three-fold, even four-fold, increase in vehicles could be reasonably expected. The surface loading on Tinian's main roads would be proportionately increased resulting in the need for increased maintenance, extensive resurfacing and perhaps major reconstruction of the highway system during the first seven-year plan period.

ROAD IMPROVEMENT PROGRAM

Between FY 1978 and FY 1985, a Northern Mariana Islands road improvement program will be initiated. The program's objectives will be to upgrade the roadway system for accommodation of the expanding economic activity and evolving physical development of the Northern Marianas. On Tinian, the road improvement program will primarily concentrate on village streets and provision of access into the Marpo Valley agricultural areas. The coral based streets in San Jose as illustrated in Plate 17 will be paved to enhance traffic circulation in the village. In addition, the southern-most of the streets in the grid pattern, identified in the same plate as the Harbor Access Road, will be connected with the extension of Broadway (past the MIHA subdivision) in order to provide an alternate route from the harbor to the airport. Federal funding of this 1.2 mile section of roadway is to be pursued since it will serve as the primary access road between the harbor and the airport.

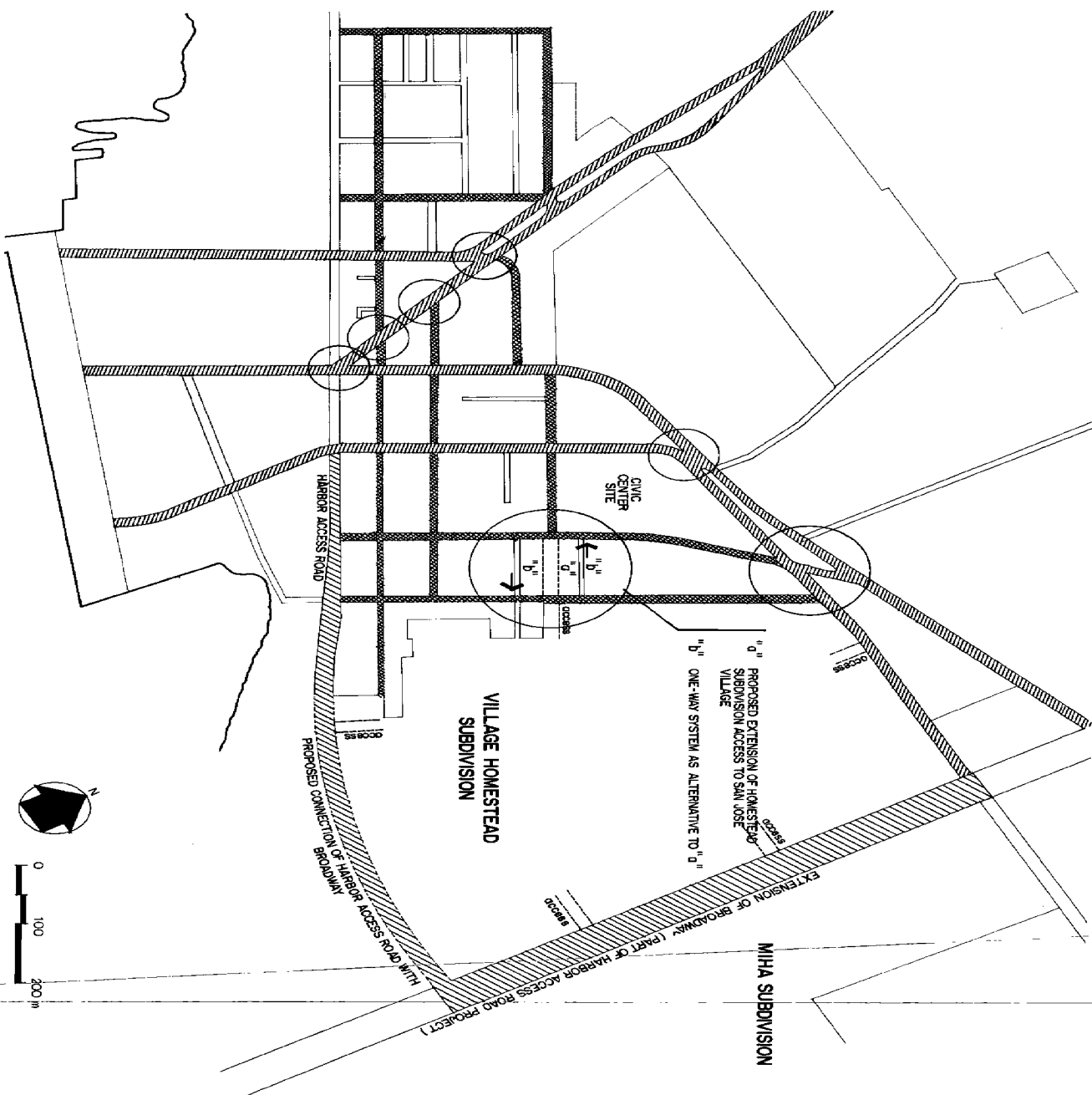
The new subdivision located to the east of San Jose Village should be provided with easy access into the village. It is suggested, then, that the subdivision's main access on the San Jose side be continued on a direct line to connect with "E" Avenue forming the southern boundary of the civic center complex. The connection would require acquisition of rights-of-way which might be accomplished through land exchange. In the event such exchanges cannot be negotiated, an alternative solution would be the improvement of the two streets to the north and south of the proposed connection and their designation as one-way streets. These improvements have been anticipated and are included in the village street program.







LEGEND

- PAVED VILLAGE STREETS
- HARBOR ACCESS ROAD-RECOMMENDED FOR FEDERAL FUNDING
- VILLAGE STREETS RECOMMENDED FOR IMPROVEMENTS
- INTERSECTIONS WITH PROBLEMS OF POOR ALIGNMENTS

TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
SAN JOSE VILLAGE
roads



LEGEND

-  PAVED VILLAGE STREETS
-  HARBOR ACCESS ROAD RECOMMENDED FOR FEDERAL FUNDING
-  VILLAGE STREETS RECOMMENDED FOR IMPROVEMENTS
-  INTERSECTIONS WITH PROBLEMS OF POOR ALIGNMENTS

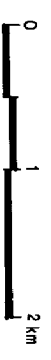
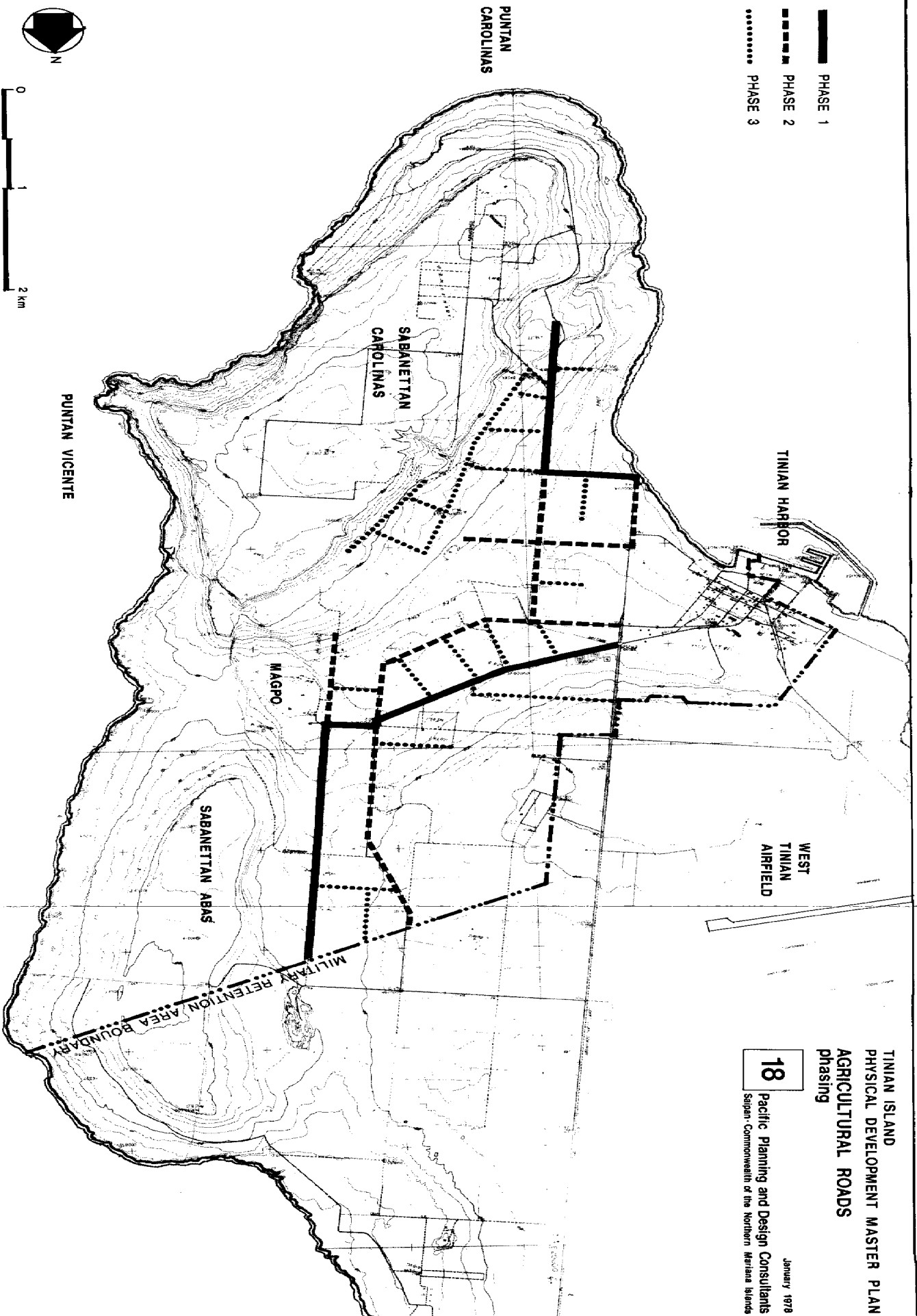
TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
SAN JOSE VILLAGE
roads

**TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
AGRICULTURAL ROADS
phasing**

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Pacific Planning and Design Consultants
Saipan Commonwealth of the Northern Mariana Islands

January 1978

- PHASE 1**
—————
- PHASE 2**
- - - - -
- PHASE 3**
.....



Agricultural access roads, as illustrated on Plate 18, will be upgraded although only stabilized coral surfaces are to be provided as traffic volumes are minimal on these roads. The improvements are to be phased over three seven-year periods due to the funding constraints. A total of 4.0 miles of agricultural roads will be improved during the immediate plan period. These roads are designated as Phase I roads on the plate. In order to complete the improvements of agricultural homestead roads, subsequent phasing programs are indicated.

Typical Cross-Sections

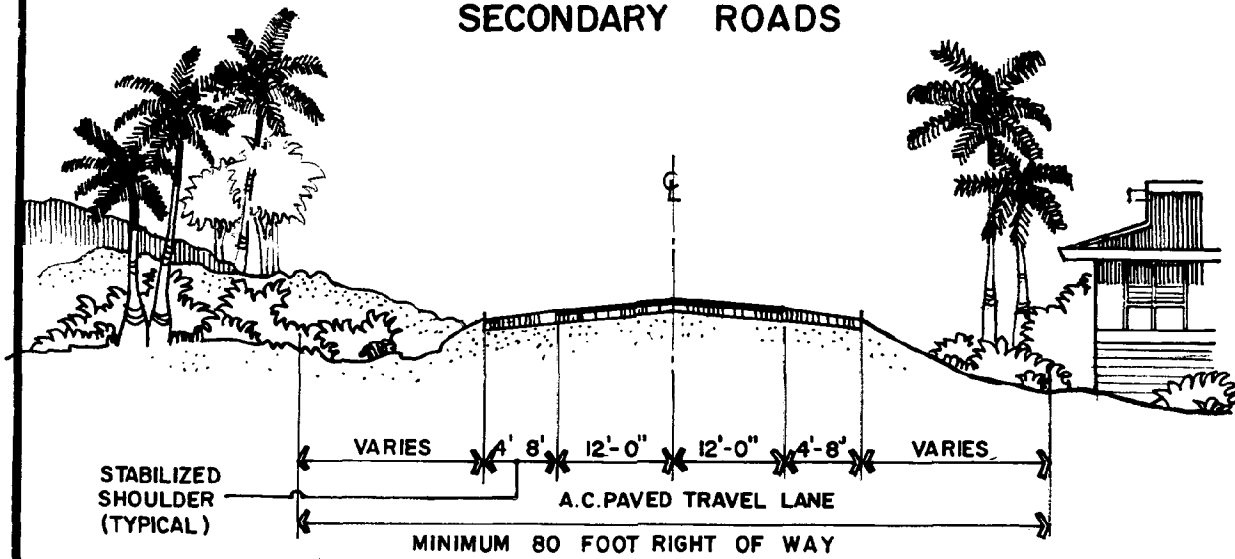
Plate 19 depicts the typical road cross-sections that are recommended for Tinian. The typical cross-section for secondary roads applies to the Harbor Access Road as identified above. Village streets will be upgraded as much as possible to provide paved surfaces with improved shoulders.

There is another category of roads for which a typical cross-section is not depicted. These roads will have stabilized coral surfaces and will function as agricultural access roads. It is anticipated that traffic volumes on these roads will not warrant paving the surfaces. However, it should be emphasized that the stabilized surfaces will require regular maintenance which if lacking will result in quick deterioration of the roadway.

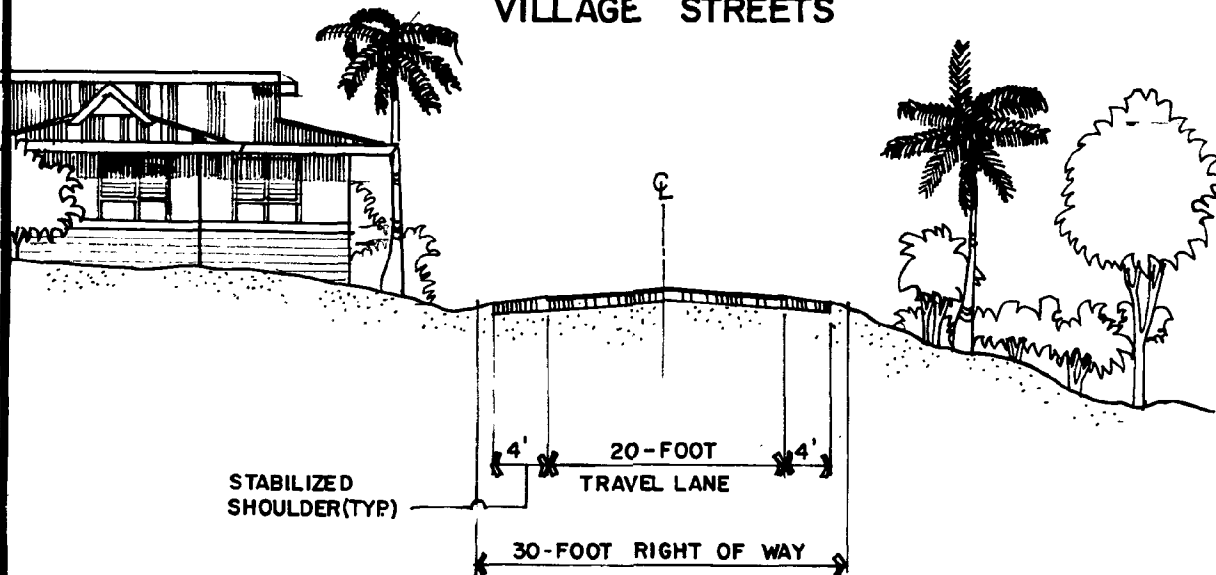
Preliminary Cost Estimates

Unit costs for construction of roads in Tinian are not available. The estimates presented in Table 10 are based on costs for similar activities in Saipan as well as on Guam. Presently, estimates for construction activities in Saipan indicate the following unit costs:

SECONDARY ROADS



VILLAGE STREETS



TINIAN ISLAND
PHYSICAL DEVELOPMENT MASTER PLAN
ROADS
recommended cross-sections

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January 1978
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TABLE 10
TINIAN HIGHWAYS
PER MILE COST ESTIMATES

Secondary Road

Grading - 40 feet wide	\$ 63,400
Six inch Base Course - 40 feet wide	73,900
Asphaltic Concrete - 2" thick, 24 ft. wide	84,500
Average Per Mile Cost for Drainage	20,000
Signing, Pavement, Stripping & Markers	<u>15,000</u>
Subtotal	\$ 256,800
A/E Design @ 10%	<u>25,680</u>
Total Cost/Mile	<u><u>\$ 282,480</u></u>

Village Streets

Grading and Drainage - 28 feet wide	\$ 59,400
Six Inch Base Course - 28 feet wide	44,400
Asphaltic Concrete - 2" thick, 20 feet wide	70,400
Signing and Stripping	<u>10,000</u>
Subtotal	\$ 184,200
A/E Design @ 10%	<u>18,420</u>
Total Cost/Mile	<u><u>\$ 202,620</u></u>

Unpaved - Stabilized Surfaces

Base Course and Drainage	\$ 55,000
Oil Penetration	<u>20,000</u>
Subtotal	\$ 75,000
A/E Design @ 10%	<u>7,500</u>
Total Cost/Mile	<u><u>\$ 82,500</u></u>

- * Grading Work \$0.30 per sq. ft.
- * Preparation of Six-inch Base Course \$0.35 per sq. ft.
- * Paving with Asphaltic Concrete to a 2" thickness \$6.00 per sq. yd.

Architectural and engineering design of highways are generally 10% of the construction costs. Accordingly, the per mile cost estimates for a completed road project on Tinian include this cost.

Program Costs 1978-1985

A total of 3.0 miles of village streets, 1.26 miles of secondary road, and 3.9 miles of agricultural access roads are expected to be improved in the plan period. Table 11 presents a summary of the total costs for the program. As shown in the table, \$1,034,700 in local funds are needed, out of which \$106,800 will be used as the local matching share for construction of the Harbor Access Road.

Funding Scheme

The road improvements are to be funded out of the Capital Improvements Program. Whenever possible, as may be in the case of the Harbor Access Road, matching funds are to be obtained from the U. S. Federal Highway Act. These federal funds are available for projects involving primary and secondary roadways. The funds are provided on a 70/30 Federal/Local matching basis.

The construction of village and rural/scenic roads are ineligible for Federal Highway Act funding and must therefore be funded exclusively from the CIP monies provided by the Covenant or from internal resources of the Northern Marianas.

Capital Improvement Program Funds have been allocated for road projects and the funding scheme by year is indicated on Table 12.

TABLE 11

SUMMARY COSTS FOR TINIAN ROAD
IMPROVEMENT PROGRAM 1978 - 1985

<u>Road Category</u>	<u>Total Mile</u>	<u>Per Mile Estimate</u>	<u>Total Costs</u>	<u>Federal Funds</u>	<u>Local Funds</u>
Secondary Road	1.26	\$ 282,480	\$ 356,000	\$ 249,200	\$ 106,800
Village Streets	3.0	202,620	607,900	**	607,900
Stabilized Sur- faces (Unpaved)	3.9	82,500	320,000	**	320,000
<hr/>					
All Roads	8.16	-	\$1,283,900	\$ 249,200	\$1,034,700
<hr/>					

NOTE:

- * To be pursued pending eligibility of project
- ** Not eligible for Federal funding aid.

TABLE 12

FUNDING SCHEME - TINIAN ROADS

<u>YEAR</u>	<u>PROJECT</u>	<u>LOCAL FUNDS</u>	<u>FEDERAL FUNDS*</u>
FY 1979	Village Roads	\$ 180,000	
FY 1980	Village Roads	180,000	
FY 1981	Village Roads	180,000	
	Agricultural Access (Rural/Scenic)	80,000	
FY 1982	Village Roads	73,200	
	Harbor Access Road	106,800	\$ 249,200*
FY 1983	Agricultural Access	160,000	
FY 1984	Agricultural Access	80,000	
FY 1985	Agricultural Access	80,000	

* Not programmed in the Socio-Economic Plan, but will be pursued for possibly eligible project.

The improvements and connection of the Harbor Access road with Broadway, as identified in Plate 17 (See Page) must be qualified with respect to the funding scheme envisioned for it. It seems apparent that the project should be eligible for federal assistance. Its connection with the southward extension of Broadway, past the Village Homestead and MIHA subdivision, will provide an alternate and easier route from the harbor to areas east and north of San Jose Village. Without the federal funding, it is doubtful whether the connection of the road with Broadway can be completed since estimates indicate that the cost of this project will exceed \$350,000.

Future Road Projects

Several needed improvements to horizontal alignments and intersections have been identified for the period beyond the horizon addressed by this plan. The locations of these intersections are concentrated in San Jose Village and are shown on Plate 17.

The exact improvements to be made at the locations have not been identified and will be subject to detailed traffic engineering analyses. The improvements are not critical at this time mainly because of the lack of significant traffic volumes which minimize the hazards of the present conditions. The determination of the traffic volume level that would warrant improvements at the intersections will also be included in the engineering analyses to be conducted.

APPENDICES

TECHNICAL AGREEMENT

HISTORIC SITES

APPENDIX I

TECHNICAL AGREEMENT REGARDING USE OF LAND TO BE LEASED
BY THE UNITED STATES IN THE NORTHERN MARIANA ISLANDS

The duly authorized representatives of the United States and the people of the Northern Mariana Islands,

Considering that they have today entered into a formal Covenant to establish a Commonwealth of the Northern Mariana Islands in political union with the United States;

Recognizing that Sections 802 and 803 of that Covenant contain provisions relating to the use of land to be leased by the United States in the Northern Mariana Islands for defense purposes;

Noting that the extent of land required for use by the United States has been determined and the precise boundaries agreed upon by both parties hereto; and

Desiring that all basic arrangements relative to land be reduced to a formal land agreement;

Have now entered into the following Technical Agreement which will be deemed to have been approved when the District Legislature of the Mariana Islands District of the Trust Territory of the Pacific Islands approves the Covenant, and which will become effective on the date that Sections 802 and 803 of the Covenant come into force.

PART I. MATTERS TO BE INCLUDED IN LAND LEASES
WITH THE UNITED STATES

1. Description. Lands to be leased by the United States for defense purposes are set forth in Section 802 of the Covenant and are further described and depicted on the maps attached as Exhibits A, B, and C.
2. Acquisition. The Government of the Northern Mariana Islands or the legal land entity established by the Marianas District Legislature to receive and administer public lands in the Northern Mariana Islands, immediately upon request, will execute the lease for the lands being conveyed to the United States Government as described in paragraph 1, above, with the duly authorized representatives of the United States under the terms set forth in Section 803 of the Covenant.

Payment under the lease will be made as soon as practicable after the appropriation of funds by the Congress of the United States. The United States may enjoy full and unrestricted use of the land immediately upon making the above payment. The amount to be paid will be adjusted at the time of payment by a percentage which is the same as the percentage change, up or down, in the United States Department of Commerce composite price index from the date of signing of the Covenant.

Should payment not be made within five years from the date that Sections 802 and 803 of the Covenant

come into force, then this Agreement will automatically terminate and both parties will be released from all liability or obligations created by this Agreement and Sections 802 and 803 of the Covenant.

3. Settlement of Claims and Encumbrances. Lands leased by the United States Government defined in paragraph 1, above, are subject to the lease of the Micronesian Development Corporation, which will be allowed to continue in accordance with its terms. All other encumbrances on or any adverse possession of lands described in paragraph 1, above, will be removed and all existing claims will be settled by the Government of the Northern Mariana Islands or by the legal entity at no additional cost to the United States Government. The United States Government will, however, pay all Title II benefits due under the Uniform Relocation and Real Property Acquisition Policies Act of 1970.

The United States Government and the Government of the Northern Mariana Islands will consult and coordinate on specific actions by either party that may affect or involve possible adjustments or termination of the Micronesian Development Corporation lease. Both parties will render full assistance to the other towards achieving specific needs with respect to the Micronesian Development Corporation lease, to include either compliance with the terms of the lease, amendments to the lease, or action to terminate

the lease. In no event will either party impede the action of the other with respect to the Micronesian Development Corporation lease. The United States Government will be responsible for damages resulting from a breach or early termination of the Micronesian Development Corporation lease resulting solely from United States initiatives. The Government of the Northern Mariana Islands will be responsible for damages resulting from a breach or early termination resulting solely from its initiatives. Both the United States Government and the Government of the Northern Mariana Islands or its legal entity will hold the other harmless from all claims arising by reason of such breaches or termination.

4. Disposal. Should the property leased to the United States on Tinian not be required for the needs or the discharge of the responsibilities of the United States Government, or otherwise become surplus property under United States law, the Government of the Northern Mariana Islands or the legal entity will be given first opportunity to acquire the interest of the Government of the United States in such property in accordance with United States law.

5. Leasebacks.

A. Tinian.

(1) General. A total of approximately 6,458 acres (2,614 hectares) out of a total of approximately

17,799 acres (7,203 hectares) on Tinian will be leased back from the land on Tinian described in paragraph 1, above, at such time as the lease to the United States Government for the land on Tinian becomes effective. All leasebacks on Tinian made pursuant to this Agreement will be subject to the following restrictions which will be contained in the leases and will be incorporated in any subleases executed by the Government of the Northern Mariana Islands or by the legal entity:

- a. Uses of land must be compatible with planned military activities;
- b. There will be no permanent construction without prior consent;
- c. Federal Aviation Administration safety zone areas apply with respect to land use;
- d. Uses that damage or have a detrimental effect on subsequent use of the land will not be permitted;
- e. All leasebacks will be subject to cancellation upon one year's notice, or sooner in the event of urgent military requirement or national emergency; and
- f. Provisions for fair compensation in the event of cancellation or early termination will be included.

(2) Area South of Present West Field. Approximately 1,335 acres (540 hectares) lying south of West Field including

the harbor area, as indicated in Exhibit A, will be made available to the Government of the Northern Mariana Islands or the legal entity under leaseback. This leaseback will be for a term of ten years with renewal rights for an additional ten years upon the approval of the United States Government, except for the harbor area which will be on a five year basis renewable with United States Government approval. These leasebacks will be for the sum of one dollar per acre per year. The Government of the Northern Mariana Islands or the legal entity may in turn sub-lease these lands on terms compatible with the leaseback, with such sub-leases subject to immediate revocation in the event of violation of their terms. Permissible uses are grazing, agriculture that does not interfere with flight safety, and other possible uses that may be approved from time to time by the United States Government.

(3) Area North of Present West Field and East of Broadway. The lands north of West Field and east of Broadway, indicated in Exhibit A, will continue to be used in accordance with the terms and conditions of the current lease with the Micronesian Development Corporation. This includes approximately 4,010 acres (1,623 hectares).

(4) Military Maneuver Area on Tinian--Grazing Leases. The United States will lease back the land within all but two of the existing grazing leases in the proposed maneuver area north of West Field shown in Exhibit A.

Substitute grazing leases will be made available within areas set aside for maneuvers north of West Field for the two leases indicated in Exhibit A which are presently located in areas with a high probability of their being used by United States forces, which renders them unsuitable for leaseback. This agreement is limited to accommodation of persons actually using this leased land for grazing purposes as of December 19, 1974. All such leases will be for five years at one dollar per acre per year, renewable with United States Government approval for additional periods of up to five years and subject to immediate revocation in the event of violation of their terms. Grazing will be the only use permitted unless authorized by the United States Government. Approximately 610 acres (247 hectares) will be leased back in this category.

(5) Military Maneuver Area on Tinian--Present Private Owners. There are 38 deeded homestead parcels and six pending homesteads in the maneuver area as indicated in Exhibit A. The Government of the Northern Mariana Islands or the legal entity will acquire the land at no additional cost to the United States Government and will provide an opportunity for the owners of these homesteads who may be eligible for new homesteads as a result of their displacement to exchange their land with comparable lands outside the military area. The homestead owners will be fully compensated by the Government of the Northern Mariana Islands or by

the legal entity if they do not choose this exchange and will, in addition, receive from the United States Government whatever relocation compensation and assistance to which they would be entitled under United States law. After this land now held as homesteads is acquired by the United States Government by lease from the Government of the Northern Mariana Islands or from the legal entity the United States Government will, on a case-by-case basis and on request, lease it back to those former owners who wish to continue to farm the land for periods of five years at one dollar per acre per year, renewable with United States approval for additional periods of up to five years. Approximately 503 acres (204 hectares) are involved in this category.

(6) Civilian Aviation Terminal Facilities, West Field. The present existing civilian air terminal may remain until its relocation is determined to be necessary by the United States Government. Sufficient land will be made available at nominal cost adjacent to the present or a future runway for civilian terminal facilities, including aprons, aircraft parking, terminal building(s), automobile parking and roadways. If a future relocation becomes necessary, the United States will reimburse the Government of the Northern Mariana Islands for fair value of the then-existing terminal building and make alternate land available at nominal cost as near to the runways and related taxiways

as practicable for construction by the Government of the Northern Mariana Islands of new terminal facilities. The costs of again relocating the terminal facilities, along with construction costs for necessary replacement of apron and parking areas, will be borne by the United States Government. Ample land provision will be made, also at nominal cost, for necessary growth and expansion of the civilian facility.

B. Saipan--Tanapag Harbor.

The United States Government will make available to the Government of the Northern Mariana Islands without cost 133 acres (53.8 hectares) out of the 177 acres (71.6 hectares) leased to the United States Government at Tanapag Harbor, as indicated in Exhibit B. This area will be set aside for public use as an American memorial park to honor the American and Marianas dead in the World War II Marianas campaign. Two million dollars (\$2,000,000) of the total funds paid by the United States Government will be placed in a trust fund by the Government of the Northern Mariana Islands, or by the legal entity, with income from the fund used to develop and maintain the memorial park. Income from this trust fund may be utilized for other purposes only with the concurrence of the United States Government. The United States will assist in this development by providing assistance in planning and technical advice. Adequate space will be provided the United States Government to

construct at its expense a memorial to the Americans who died in the Marianas campaign. In addition, the Government of the Northern Mariana Islands may erect its own memorial to Marianas war dead at its expense. The remaining 44 acres (17.8 hectares) will be made available to the Government of the Northern Mariana Islands or to the legal entity by leaseback on the same terms and conditions named in paragraph 5A(1), above, as appropriate. Uses of the 44 acres must be harbor-related as determined by the United States. The definition of harbor-related activities will be made available to the Government of the Northern Mariana Islands on request and incorporated in subleases in the area. Leases will be for ten years and will be automatically renewable.

C. Other Leasebacks. The Government of the United States may from time to time lease back other land temporarily in excess within the land described in paragraph 1, above, to the Government of the Northern Mariana Islands or to the legal entity in accordance with applicable laws and regulations.

PART II. JOINT USE

The Government of the United States or its duly authorized representative will enter into joint use agreements with a duly authorized agency or agencies of the Government

of the Northern Mariana Islands, when such agency or agencies have been established by the Government of the Northern Mariana Islands, which will cover among other things the following:

1. San Jose Harbor, Tinian. San Jose Harbor will initially be under Government of the Northern Mariana Islands control under specific terms of the leaseback. If a decision is made by the Department of Defense to implement plans for an operational joint service base on Tinian, appropriate joint control arrangements will be agreed upon for the construction and subsequent periods to accommodate the needs of the civilian community along with military needs. At such time as joint control arrangements become necessary, the feasibility of adopting standards which will permit uninterrupted commercial shipping operations during fuel transfer operations will be investigated so as to minimize the possible interference with civilian activity. When the United States upgrades the existing harbor the Government of the Northern Mariana Islands will upgrade its approximately 600 feet of wharf space or reimburse the United States for having such services performed as part of the United States construction project.

With respect to the two plots totalling approximately nine acres (3.6 hectares) immediately adjacent to the 600 foot civilian wharf shown in Exhibit A, the Government

of the Northern Mariana Islands will place appropriate restrictions on their use for harbor-related activities only.

2. West Field, Tinian

A. General Use. For aviation purposes the Government of the Northern Mariana Islands and the civilian community of Tinian will have continuous joint use of West Field with exceptions for safety of flight and priority military operations. The Government of the Northern Mariana Islands will have operational responsibility for West Field, except during periods of military use, until the United States assumes permanent operational responsibility. During such periods the Department of Defense will assume operational responsibility and control.

B. Development Costs. The cost of improving and maintaining present civilian terminal facilities and future civilian terminal facilities will be borne by the Government of the Northern Mariana Islands.

C. Fuel Supplies. After the United States military takes over control and management of the field standard military aviation fuels and oils will be supplied as soon as they become available, subject to Federal Energy Administration allocation, on a cost basis by the Government of the United States to the Government of the Northern Mariana Islands for civil and compatible commercial aviation needs on Tinian. It is understood that provision of such

fuels and oils will not be permitted to compete with private commercial enterprises performing this service.

D. Terminal Utilities. The Government of the United States during its planning of future base facilities will take into consideration the needs of the future civilian terminal area for water, power, telephone and other utilities applicable to a terminal facility so as to make available to the civilian terminal appropriate utility hookups at the closest practicable locations to allow for civilian development of these utilities and joint use thereafter on a reimbursable basis.

E. Use of Present Facilities. The use of facilities presently in existence at the West Field location and the use of the present air strip will continue on an uninterrupted basis prior to, during and subsequent to initial construction upgrade and during any future improvement program to the greatest extent possible. There will be close coordination with the Government of the Northern Mariana Islands to insure as little hardship as possible should interruptions of the use of the present West Field and its terminal facilities be necessary for military operations such as maneuvers. The use of a runway and taxiways may be curtailed from time to time to allow appropriate and adequate construction and repair work to be accomplished. This construction and repair work will at all times be

coordinated with the civilian community so as to minimize any hardships involved.

F. United States Facilities. When an operational military airfield is established at West Field, Tinian, the United States Government will provide such aircraft and structural fire protection services and aircraft crash rescue services as are available. The cost of such services shall be borne by the United States Government, subject to charging appropriate fees for users of these services.

G. Landing Fees. At such time as the military forces permanently take over operation of West Field, commercial aircraft will be charged the minimum allowable landing fees according to the standard policy of the appropriate military department, and collection will be in accordance with the terms of the formal joint use agreement. In the interim the Government of the Northern Mariana Islands may establish and collect landing fees from all non-United States Government aircraft.

H. Access, Security and Customs.

(1) Access to the present and future civilian air terminal area will be unrestricted.

(2) Security in and around the present and future civilian air terminal and operation and maintenance of the civilian facilities will be the responsibility of the Government of the Northern Mariana Islands or its representative.

(3) Customs inspections of all persons, baggage and freight will be in accord with all applicable laws and implementing regulations with the general principle established that whenever and wherever possible this customs inspection shall be performed in the military area by customs inspectors arranged for by the military and in the civilian area by customs inspectors arranged for by the Government of the Northern Mariana Islands.

PART III. SOCIAL AND CIVIL INFRASTRUCTURE ARRANGEMENTS

The following provisions, unless modified in writing by mutual agreement of the duly authorized representatives of the United States Government and the Government of the Northern Mariana Islands, will govern the future relations between the United States military forces in the Northern Mariana Islands and the civil authorities thereof. Coordination on these arrangements will be accomplished through a Civil-Military Advisory Council organized as soon as required after implementation of this Agreement.

1. Civilian Responsibilities. It is understood that the Government of the Northern Mariana Islands has full responsibility for planning, as well as developing, all facilities and services for the Tinian civilian community.

2. Fishing and Shoreline Activities, Tinian.
All shoreline areas in and around the northern two-thirds

of Tinian will remain open to fishermen at all possible times except for those limited areas that must be closed to comply with safety, security and hazardous risk requirements as may develop from either military activities or commercial activities.

3. Beaches, Tinian. Marianas citizens will have the same access to beach areas in the military areas of Tinian for recreational purposes as military personnel and their dependents. During times of military maneuvers, operations or related activity the use of certain beaches or areas of the beach will be restricted. Closure for such purposes, however, will be kept to a minimum consistent with military requirements in the interest of safety and security. Conduct of all personnel within the beach areas and use of these areas will be subject to applicable military regulations.

4. Utilities

A. Utilities planning will be undertaken for Tinian on an island-wide basis, taking into account reasonable projections of civilian population at the time development by the military becomes necessary. Planning accomplished by the United States will be closely coordinated with planning by the Government of the Northern Mariana Islands. The Government of the Northern Mariana Islands will bear the cost of civilian planning by either undertaking

the planning work or reimbursing the United States for planning services.

B. The Government of the Northern Mariana Islands will take necessary action to obtain such federal funds as are available for planning pursuant to the Housing and Community Development Act of 1974 and other relevant laws.

C. When utilities are constructed for military purposes the United States Government will make excess capacity of utilities available to the civilian community on Tinian on an appropriate fee basis if desired. Use of this excess capacity by the civilian community is to be without contribution into the development costs of the capacity, and the United States Government will not be expected to create or to insure any such excess capacity for the civilian community on Tinian.

D. When utilities are constructed for military purposes, additional capacity can be added subject to full payment for the incremental costs by the Government of the Northern Mariana Islands.

5. Water. Potable water will be made available to the United States military base by the Government of the Northern Mariana Islands at a mutually agreed cost.

6. Medical Care. In accordance with applicable guidelines and regulations, emergency care in military facilities established on Tinian will be provided by the

military to all residents of Tinian when available on the island. In addition medical care in military health facilities on Tinian on a non-emergency basis will be provided residents of Tinian where civilian capacity is non-existent, subject to the capacity and capability of the military and professional staff and availability of such Tinian military health facilities. Costs for all medical care will be at the prevailing reimbursement rates.

7. Fire Protection. When military firefighting facilities become necessary a mutual fire protection aid agreement similar to that type of agreement presently provided voluntarily by the military services in other locations will be entered into between the military facility on Tinian and the local community.

8. Base Exchange, Commissary and Movies. At such time as an operating base is established purchasing of commodities by the civilian community from the base exchange and commissary will be prohibited, but use of base movies by the civilian community as guests in accordance with existing regulations will be permitted.

9. Schools. Prior to the arrival of significant numbers of school age dependents of military personnel, appropriate local and federal officials will initiate such advance consultation and school development programs as necessary to secure federal assistance as may be required

for an integrated local school system adequate to provide for all stages of Tinian's development. The Department of Defense will consult with and advise the appropriate officials of the Northern Mariana Islands as soon as possible regarding such programmed arrivals.

10. Assistance to the Community. The United States Government will consider sympathetically all bona fide requests from the community or its residents for materials or technical assistance, from resources on the base, in the event local resources are insufficient to meet the community needs.

11. Economic Opportunity. To the extent practicable appropriate United States military and civilian authorities or contractors executing United States Government contracts will attempt to utilize the resources and services of people of the Northern Mariana Islands in construction, development, supply and maintenance activities in the Marianas. Further, United States military and civilian authorities will, whenever practicable, provide technical and training assistance to the people of the Northern Mariana Islands in accordance with applicable United States law to assist in their achievement of necessary skills.

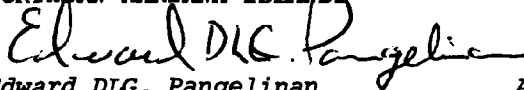
PART IV. IMPLEMENTATION

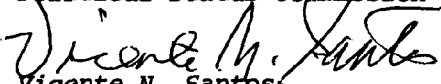
This Technical Agreement will become effective

when Sections 802 and 803 of the Covenant come into force. Subordinate formal implementing agreements are to be executed as soon as possible.

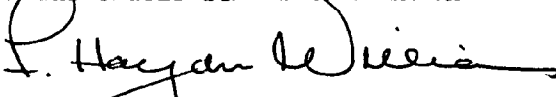
Signed at Saipan, Mariana Islands on the fifteenth day of February, 1975.

FOR THE PEOPLE OF THE
NORTHERN MARIANA ISLANDS


Edward DLG. Pangelinan
Chairman, Marianas
Political Status Commission


Vicente N. Santos
Vice Chairman, Marianas
Political Status Commission

FOR THE UNITED STATES OF AMERICA


Ambassador F. Haydn Williams
Personal Representative of the
President of the United States

Members of the Marianas Political Status Commission:


Juan LG. Cabrera


Joaquin I. Pangelinan


Vicente T. Camacho

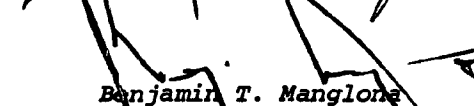
Felix F. Rabauliman


Jose R. Cruz

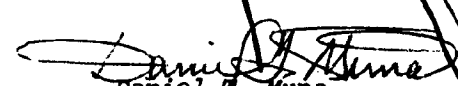
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Joannes R. Taimanac


Daniel T. Muna


Pedro A. Tenorio


Dr. Francisco T. Palacios

APPENDIX II

HISTORIC SITES

Tinian has several numerous historic and scenic sites. World War II relics can still be seen throughout the island. Japanese shrines and monuments are still preserved by the people as well as Latte Stones. Latte Stones are prominent relics of prehistoric time in the Marianas. Tinian has the largest standing Latte site in the Marianas. The following sites have been listed on Tinian (See Plate 11, page 55).

(1) MEMORIAL CROSS

This is a memorial to the seven Tinianese and one Saipanese who drowned off Puntan Tahgong (Ushi Point in some reference) early in 1974 when their small boat capsized in the heavy seas. There is a large cross (about 10' high) with eight small ones, and a prayer offering area. The site is clearly seen from the ocean. This is the northern tip of Tinian. Nearby the memorial is the foundation of a building (American) with 17AAA inscribed at the foot of the steps.

(2) ATOMIC BOMB LOADING PITS

This site is located in the northwest corner of North Field and consists of two memorial areas with plaques detailing the events of the two atomic bombs dropped on Hiroshima and Nagasaki. The B-29's that carried the bombs were based on Tinian. North Field is located off the north end of Broadway, a road running the length of the island.

(3) FORMER JAPANESE ARMY AIRPORT COMMAND AND COMMUNICATION BUILDING

All of these sites are located just North of runway number 4 and south of the atomic bomb loading pits in the western portion of North Field. There is a small road going north from runway 4 which leads directly to the site. There are several concrete bunkers, a concrete runway, fuel dump bunkers, a well preserved communications building and a large building formerly used as an Officer's Club which was partially damaged during the war. It sustained a direct hit during the bombing of Tinian; however, it is still in good shape.

(4) NORTH FIELD LATTE SITE (ANCIENT CHAMORRO SETTLEMENT)

This site was described by Spoehr as having one latte house and a small shed area. The area is situated within the boundaries of North Field near the western part of runway 2. It has been partially destroyed by war activities and by an explosion in which the Americans blew up ammunitions when leaving Tinian.

- (1) Late Site - a "latte" is a truncated pyramid with a square base (called a "shaft") and a teacup-shaped stone (capstone) on top of it. Both are made from coral rock. A latte house contains from 8 to 12 of these in two paralleled rows. They are from several hundred to over 1000 years old.
- (2) Alexander Spoehr - "Mariana Prehistory" 1951 Field Museum on Chicago Press.

(5) UNAI CHULU LATTE SITE (ANCIENT CHAMORRO)

This site has one known latte house with 8 stones, two of which are standing. Unai Chulu means Net Beach, also called Invasion Beach by the Military. The site area is large, starting at the present road to Unai Chulu and running throughout the area to the south part of the beach. Several unique pottery types were discovered there, along with several stones and shell tools. The latte house is in a dense area of napier grass. The pottery area has moderate to heavy concentrations of sherds and exhibits two possible levels. Near the beach most artifacts are partly damaged by war activity. This site should definitely be investigated as it has not been noted in previous literature.

(6) DUMCOKE CAVE (SAN HILO) (ANCIENT CHAMORRO SETTLEMENT)

The area is called Puntan Lamanibot Sanhilo on the map. This cave is about 15 feet down from the top of the cliff along the western coast of Tinian about 1 1/2 mile south of Unai Chulu (#5). This is an area with sharp weathered coral rock, so one must walk about 1/4 mile along the cliff line. There are potteries in the cave covered by soil. The cave has paintings that may be prehistoric, judging from their design. There is a marker on the cliff top placed by a survey team which makes the cave easy to find.

(6a) DUMCOKE CAVE (SAN PAPA) (ANCIENT CHAMORRO SETTLEMENT)

This is another site containing at least two caves at the base of the same cliff between Puntan Lamanibot

San Hilo and Puntan Lamanibot San Papa. The caves have been described as been covered with paintings. These caves were not investigated because we were not able to descent. The two caves are extremely important archaeological sites because they are the only known caves with painting in the Marianas excluding Guam.

(7) ASAHI TORII (JAPANESE)

The Asahi Torii is located in a "Traffic circle" at the north end of "Broadway" (refer to #2). It is south of the "North Field" area and contains a recent Japanese religious monument as well as the pre-war torii and foundation.

(8) UNAI DANGKULO LATTE SITE (ANCIENT CHAMORRO SETTLEMENT)

This site is located on the eastern side of the island along a place called "Long Beach", north of the slaughterhouse on Jones Ranch (formerly a Japanese Command Building #24). Latte houses were found by Spoehr on this area. Pottery and other artifacts were found at the beach area. Latte shaft was also found. The indicated pottery area extends all along the beach area.

(9) ASAHI SHRINE (JAPANESE)

The Japanese build a large shrine or temple at the point of a cliff area called Laderan Mangpang, which can be reached by following a road eastward from the west road of Tinian south of North Field. At the end of the dirt road, there is a trail to the shrine. The Shrine is composed of two prayer areas. This site overlooks the old Japanese airfield and Saipan.

(10) N.K.K. TORII (JAPANESE)

The N.K.K. was the sugarcane refinery in pre-war times. There is a torii marking its entrance. It is just a few hundred feet south of the Asahi Torii on the west side of the road. Building foundations are located along the area.

(11) JAPANESE COMMAND STATION (JAPANESE)

A large well preserved Japanese Command Station (now used as a Slaughterhouse by Jones Ranch), is about halfway from the village to North Field just east of Broadway. It is in a flat area close to the road and easily seen.

(12) 86TH STREET SHRINE (JAPANESE)

This is another Japanese Shrine located south of 86th Street", the main East-West road north of the village. It is accessible only by foot.

(13) PUNTAN ADGIDUN LATTE SITE (ANCIENT CHAMORRO SETTLEMENT)

This point is the west point south of Puntan Lamani-bot San Papa. Spoehr found 4 huge badly weathered latte houses with several sherd area. Artifacts were also found.

(14) LEPROSARIUM SITE (ANCIENT CHAMORRO SETTLEMENT)

This site consists of three and possibly four latte houses arranged end to end, along the line of the coast about 50-100 feet apart. The houses have 8 or 10, 1 and 2 stones respectively. The one with 1 stone is not certain to be a latte structure. Numbers 3 and 4 has yielded some unique pottery types. Number 1 was investigated archaeologically and found to contain many new types of information and artifacts which will shed light on the pre-history of the ancient chamorros.

(15) LEPROSARIUM HOSPITAL AND CEMETERY

There are foundations here of the hospital. The cemetery was used to bury dead lepers from the hospital, which was used as a central hospital for treatment of leprosu after World War II. When its purpose was accomplished, it was destroyed.

(16) CREMATORIUM AND MONUMENT (JAPANESE)

This is the site where countless Japanese soldiers who died during the war were cremated. The bones are brought here and cremated in a special ceremony.

(17, 18, 19)

SAN JOSE VILLAGE SITE "TAGA HOUSE"

The village is located on the western side of Tinian south of West Field and contains Chamorro, Japanese and American sites. The Taga house, the largest of all standing latte structures, is located on the first road running parallel to the dock. Taga's daughter's well, and another prehistoric site, is a few hundred yards east of Taga house. Near the Taga house are two memorial to war dead, one Japanese and one Okinawan.

There are also many Japanese buildings in the village, including a fire house, a jail house, a communication building, house foundations, and other historical buildings in various states of repair. All are partly damaged. There is another prayer area by the school where Japanese come to honor their war dead. A foundation near the Taga house was investigated archaeologically and was determined to be a bath house.

(20) TAGA BEACH AND LATTE STONE QUARRY (ANCIENT CHAMORRO SETTLEMENT)

This site is a cliff area with a beach used by the local people. At the northern end of the beach is the quarry for the latte stones. It was along this cliff area to the north where the latte stones were cut by stone tools and carried to the sites. This is the only known latte quarry on Tinian.

(21) BLUE SITE (ANCIENT CHAMORRO SETTLEMENT)

This site consists of 8 latte houses that run parallel to the beach. This is an extensive site and should be preserved as it could tell us much about ancient chamorro life.

(22) SUICIDE CLIFF (JAPANESE)

This cliff is where the Japanese leaped to death rather than surrender. This is also a scenic place. Also, there are many caves, with war relics in the area. Bombs, grenades, mortars, and other war elements are scattered throughout the area.

(23) MARPO SHRINE (JAPANESE)

This shrine is inaccessible except by foot. It may be reached by going out of the village to the east of Marpo Valley. The shrine is located in the southern part of the valley in dense undergrowth.

(24) MARPO LATTE SITE (ANCIENT CHAMORRO SETTLEMENT)

This site contains 8 latte shafts with a sherd area. One stone mortar was also found by Spoehr.

(25) MARPO LATTE SITE 2 (ANCIENT CHAMORRO SETTLEMENT)

There are two latte houses on the eastern part of the north branch of the valley. One had 10 shafts and the original number of the other could not be determined. Spoehr found a mortar here.

(26) MASALOG LATTE SITE (ANCIENT CHAMORRO SETTLEMENT)

The Masalog site contains several latte stones. Investigations of this site showed a very small (stones are only about 2 1/2 feet high) 8 shaft house with one large mortar and a larger (stones about 5 to 5 1/2 feet high) house with 10 and possibly 12 stones. The area has a pottery area extending along the two roads.

(27) FORMER QUARTERS OF GENERAL LeMAY (WORLD WAR II HISTORY)

The U-Shape frame building consists of five guest rooms, the former house of Major General Curtis E. LeMay. This historic house today is used as a hotel for tourists as well as the house of Henry Fleming, one of Tinian's oldest citizen. The battle plans that finally ended World War II were decided inside this building.

